

# KENWOOD

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# SERVICE MANUAL

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## TS-711A/E, TS-811A/B/E

AC-10,  
CD-10,  
TU-5, VS-1

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### 144MHz/430MHz ALL MODE TRANSCEIVER

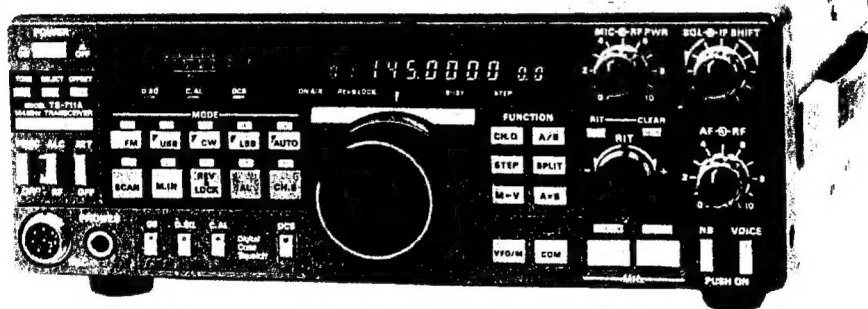


Photo is TS-711A.

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CIRCUIT DESCRIPTION

UNIT	MODEL	TS-711A (K,M1,M2,X)	TS-711E (T,W)	TS-811A (K)	TS-811B (M,X) TS-811E (T,W)
SWITCH UNIT		X41-1580-11	X41-1580-61	X41-1580-01	X41-1580-01 (M,X) X41-1580-62 (T,W)
AVR UNIT		X43-1490-11	X43-1490-11	X43-1490-11	X43-1490-11
RF UNIT		X44-1620-11	X44-1620-01	X44-1650-11	X44-1650-01
FINAL UNIT		X45-1380-11	X45-1380-11	X45-1390-11	X45-1390-01 (M,X) X45-1390-61 (T,W)
IF UNIT		X48-1400-11	X48-1400-00	X48-1400-01	X48-1400-01
AF UNIT		X49-1180-00	X49-1180-00	X49-1180-00	X49-1180-00
PLL UNIT		X50-1990-11	X50-1990-00	X50-1990-12	X50-1990-01
HET UNIT		—	—	X50-2010-10	X50-2000-00
TONE UNIT		—	X52-1290-60	—	X52-1290-60 (T,W)
CONTROL UNIT		X53-1410-11 (K,M1)	X53-1410-51 (T)	X53-1410-12 (K)	X53-1410-22 (M,X)
		X53-1410-21 (M2,X)	X53-1410-61 (W)		X53-1410-52 (T) X53-1410-62 (W)
DISPLAY UNIT		X54-1820-11	X54-1820-11	X54-1820-11	X54-1820-11

Table 1 TS-711A/E, TS-811A/B/E PC Board chart

TS-711A/E

Destination	Frequency (MHz)	VFO step (kHz)	TX OFFSET DISPLAY	Repeater shift (kHz)	Tone circuit
K,M1,M2	144.000~147.995	5	— S +	±600	Option
T	144.000~145.995	12.5	— S +	±600	1750Hz Tone Burst
W	144.000~145.995	12.5	— S +	±600	1750Hz Tone
X	144.000~147.995	5	— S +	±600	Option

TS-811A/B/E

Destination	Frequency (MHz)	VFO step (kHz)	TX OFFSET DISPLAY	Repeater shift (kHz)	Tone circuit
K	430.000~450.000	25	— S +	±5	Option
M,X	430.000~440.000	25	— S +	±5	1750Hz Tone Burst
T	430.000~440.000	12.5	— S +	±1.6	1750Hz Tone
W	430.000~440.000	12.5	— S +	+7.6 -1.6	Option

Table 2 Frequency configuration of destination

MODE	CH.F		K,M1,M2	T,W
	STEP	OFF		
FM	OFF	10Hz	5kHz	12.5kHz
	ON	100Hz	5kHz	5kHz
SSB	OFF	10Hz	5kHz	5kHz
	ON	100Hz	1kHz	1kHz

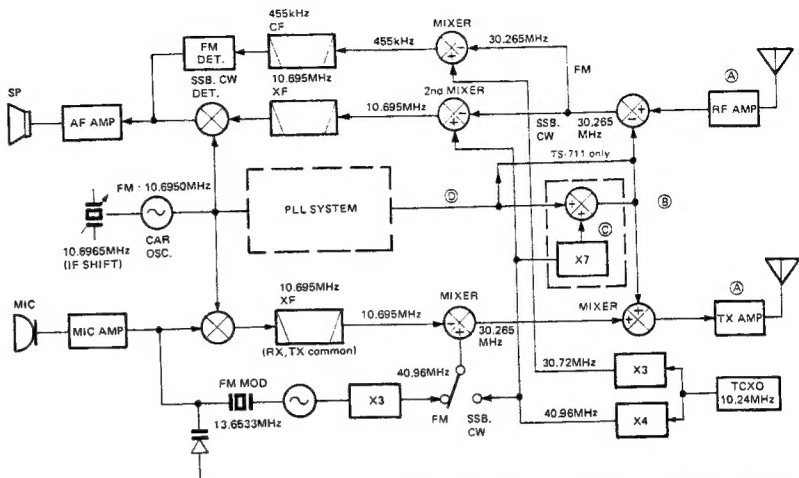
Table 3 Frequency step function's chart

TS-711/TS-811 FREQUENCY CONFIGURATION

Fig. 1 represents the frequency configuration. Reception uses a double conversion superheterodyne system, in which the second IF (Intermediate Frequency) differs according to the mode. Here, the signal from the antenna is mixed with the PLL (Phase Locked Loop) local OSC (Oscillator) signal in the first mixer common to the respective modes and is then converted to the first IF at 30.265MHz. At this point, the first IF is separated between SSB/CW and FM modes. In SSB/CW, it is mixed with a 40.96MHz local OSC signal (4 times the TCXO frequency) in the second mixer (Q34) and is converted to the second IF at 10.695MHz. Then, this IF is product detected with a 10.6965MHz carrier. In the FM mode, it is mixed

with the 30.72MHz local OSC signal (3 times the TCXO frequency) in the second mixer (Q36) and is converted to the second IF at 455kHz. Then, this IF is detected. In SSB/CW transmission, the SSB/CW signal at 10.695MHz is mixed with the 40.96MHz local OSC signal (4 times the TCXO frequency) in the balanced mixer (Q6/Q7) and is converted to a 30.265MHz signal. It is then mixed with the 113.735~115.725MHz PLL signal to the transmission frequency. In case TS-811, PLL signal (113.015~123.005 MHz) mixed with the 296.720MHz (A), 286.720MHz (B,E) HET signal to the transmission frequency. In the FM mode, a 13.6533MHz X'tal OSC signal, used in place of the 40.96 MHz local OSC signal, is modulated and multiplied by 3 to a 40.96MHz local OSC signal.

CIRCUIT DESCRIPTION



Model	TS-711 (K,M1,M2,X)	TS-711 (T,W)	TS-811 (K)	TS-811 (M,X) TS-811 (T,W)
(A)	144.000 ~ 147.995MHz	144.000 ~ 145.995MHz	430.000 ~ 449.995MHz	430.000 ~ 439.995MHz
(B)	113.735 ~ 117.730MHz	113.735 ~ 115.730MHz	399.735 ~ 409.730MHz	399.735 ~ 419.730MHz
(C)	—	—	296.720MHz	286.720MHz
(D)	113.735 ~ 117.730MHz	113.735 ~ 115.730MHz	113.015 ~ 123.005MHz	113.015 ~ 123.005MHz

Fig. 1 Frequency-related block diagram

RF UNIT

(X44-1620-XX) : TS-711, (X45-1650-XX) : TS-811

● Reception system

The signal input from the RA terminal enters the RF amplifier (Q1) through the ATT circuit (−20dB) TS-711 only. The RF amplifier uses GaAs FET : 3SK129. The input uses a 2-pole helical and the output a 3-pole helical, thus obtaining the desired bandwidth and skirt attenuation. The input signal is converted in the receiving mixer, Q2 : C-MOS FET : 3SK122 (in the TS-811, GaAs FET : 3SK129), to the first IF at 30.265MHz. Then, the first IF is converted to the RIF level signal through the 2-stage MCF (Monolithic Crystal Filter) and is output to the IF unit.

● Transmission system (TS-711)

The lower IF signal (30.265MHz) from the IF unit is mixed with the HET signal in the FET balanced mixer (Q3, Q4 : 2SK192A(GR)\*N) and converted to the transmission frequency. From this transmission signal, any spurious component is eliminated by the 5-stage VCT (Varactor Tuned) circuit in which the PLL unit CV (Correction Voltage) is used.

Further, the transmission signal is amplified up to the drive output level of for the output transceiver 0.3W for the output transceiver in amplifier Q6. This output is fed to the final module.

● Transmission system (TS-811)

The lower IF signal (30.265MHz) from the IF unit is mixed with the HET signal in the Schottky-type DBM (Double Balanced) mixer and is converted to the transmission frequency. From this signal, any spurious component is eliminated by the 2-stage band-pass amplifier with small Hi-Q helical coils. In particular, the second-stage band-pass amplifier has helical coils connected in series, thus providing acute BPF characteristics.

Further, the transmission signal is amplified up to the drive output level of for the output transceiver 0.35W for the output transceiver in amplifier Q4. This output is fed to the final module. VR1 at Q4 controls Q4's idling current. The idling current is set to about 15mA for this stage.

Item	Rating
Nominal center frequency	30.265MHz
Pass bandwidth	± 6.5kHz or more at 3dB
Attenuation bandwidth	± 32kHz or less at 40dB
Ripple	1.5dB or less
Loss	3dB or less
Guaranteed attenuation	60dB or more within ± 1MHz Spurious level : 40dB or more
Input and output impedance	1.4kΩ ± 10%/1pF ± 10%

Table 4 MCF (L71-0248-05)  
(RF unit L4 TS-711, L16 TS-811)

## CIRCUIT DESCRIPTION

## IF UNIT (X48-1400-XX)

## ● Reception system

The reception system is generally divided into SSB/CW and FM modes.

## 1) SSB/CW mode

The RIF signal (30.265MHz) from the RF unit (X44-1620-11 : TS-711, X45-1650-XX : TS-811) is mixed with the 40.96MHz output from Q2 at Q34 : 3SK73(Y) and is converted to the 10.695MHz second IF. Then, this signal is amplified via the noise blanker gate circuit and SSB filter L12 by IF amplifiers Q20-22 : 3SK73(GR) (to which AGC is applied), and is then mixed with the carrier OSC signal by product detector (D10-13 : IN60) to obtain a demodulated audio output.

For AGC, the IF output of Q22 is taken through AGC buffer Q24 : 2SC2458(Y). Q23 controls the AGC voltage. Part of the output of AGC buffer Q24 is connected as the SSB squelch release signal with SSB squelch mixer Q40 : 2SC2668(Y,O) via Q39.

Q25 is the AGC time constant selection circuit. Q26 and Q27 from the S-meter amplifier.

## 2) FM mode

The RIF is input to mixer Q36 : 2SC2668(Y) via gate-grounded amplifier Q35 : 2SK125. For the local OSC signal, 30.72MHz is obtained by multiplying the PLL 10.24MHz reference by 3-times (Q38). There, the RIF signal is converted to the 455kHz second IF. This output is amplified via ceramic filter L31 in the IF amplifiers, consisting of Q44 : TA7302P, Q45 : 2SC2668(Y) and Q46 :  $\mu$ PC577H, and is then demodulated by ceramic discriminator L34 : CFY455S.

The demodulated signal is filter separated between the AF pre-amplifier Q49 : 2SC2458(Y) and the squelch noise amplifier Q53 : 2SC2458(Y), Q54 : 2SC3113(B). The "busy" lamp is controlled by the squelch circuit and the center detection circuit Q47 :  $\mu$ PC4558C. To suppress ignition noise, a "killer" circuit using Q62 is added and is controlled by Q61.

## 3) Noise blanker

Q41 noise amplifier the second IF output, obtained by mixing the 30.265MHz first IF at Q36. It is switched by Q43. Q37 is a switching circuit to blank PLL reset noise which would otherwise occurs every 20kHz.

## 4) SSB squelch

This acts as a noise squelch. The SSB squelch release signal, taken from AGC buffer Q24, is input to buffer Q39 through squelch sensitivity pot VR6. This output is mixed with 10.24MHz in the SSB squelch mixer Q40 and converted to 455kHz. This signal is then input to the FM IF amplifier. Thereafter, the FM squelch circuit is used to provide SSB squelch.

In the SSB mode, Q56 in the squelch circuit operates to set the attack and slow release time constants.

## ● Transmission system

## 1) SSB and CW mode

The audio signal from the AF unit is amplified in the microphone amplifier Q28-30 : 2SC2458C and sent to the balanced modulator, D16 : ND487C1-3R. In CW mode, the modulator is unbalanced by DC, and this carrier signal output from the modulator is used. The double sideband output is filtered by SSB X'tal filter L12 amplified by FET Q5 : 3SK73(GR), and mixed with the 40.96MHz output from Q2 in balanced mixer Q6, Q7 : 2SK161(GR) for conversion to the TIF (Transmit IF) signal at 30.265 MHz. Then, the TIF signal is amplified by FET Q8 : 3SK73(GR) and sent to the RF unit. In CW mode, keying controlled by Q32 and Q8 gate biases using -6V and Q13 switching.

## 2) FM mode

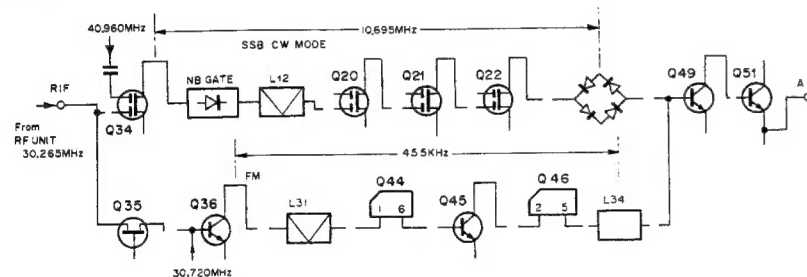
The carrier signal output from the unbalanced SSB modulator is used. Different from the SSB/CW mode is that the local OSC signal used in FM for balanced mixers Q6, Q7 is supplied by X'tal OSC L4 (13.657MHz), which in FM mode operates at 13.6533MHz, pulled by varicap D3. This OSC output is tripled 40.96MHz. In the FM mode,  $\pm 5$ kHz frequency deviation is obtained after tripling the direct modulated X'tal OSC output.

## 3) Power control

Fig. 3 shows the power control circuit configuration. The final output is detected, and the ALC (Automatic Level Control) voltage is controlled by Q4 in the Display unit (X54-1820-11). The ALC voltage is applied to the second gates of FETs Q5 and Q8, by which the TIF level is adjusted and then APC (Automatic Power Control) is applied. In addition, the power control, in which two pots are used, controls the G2 voltage of generator buffer Q32, to counter excessive ALC at low power.

## CIRCUIT DESCRIPTION

## RX SECTION



## TX SECTION

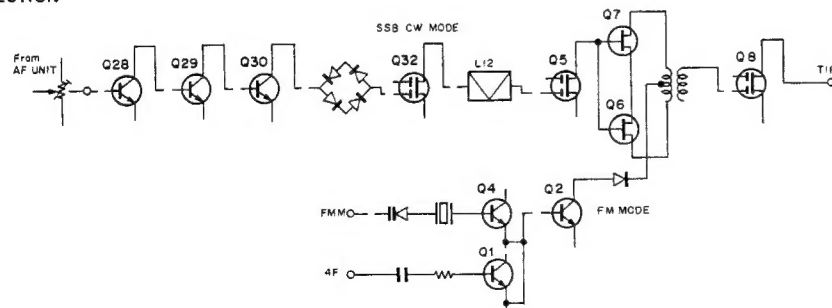


Fig. 2 IF unit block diagram

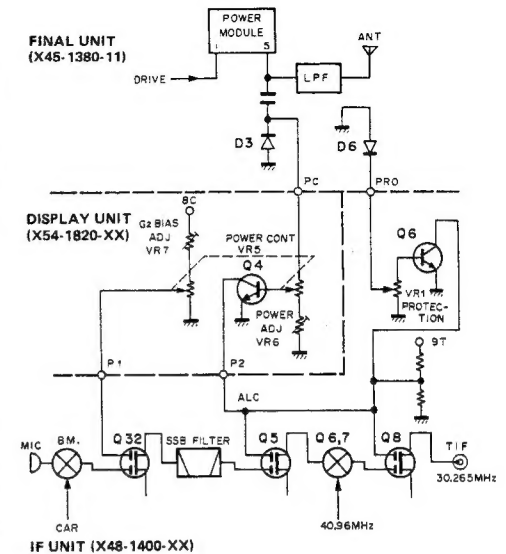


Fig. 3 Power control configuration (TS-711)

Item	Symbol	Condition	Rating			Unit
			Max.	St.	Min.	
Forward Voltage (DC)	VF1	IF=50mA			0.7	V
Forward Voltage (DC)	VF2	IF=1.0mA		0.2	0.3	V
Forward Voltage Difference	$\Delta VF2$				0.02	V
Terminal Capacitance	Ct	VR=0		0.9	1.2	pF
Terminal Capacitance Difference	$\Delta Ct$	f=1.0MHz			0.2	pF

Table 5 ND487C1-3R Electric characteristic (IF unit D16)

# CIRCUIT DESCRIPTION

## AF UNIT (X49-1180-00)

### • Microphone amplifier

The signal from the microphone is amplified by Q1 : 2SC2459(GR), which is common to both FM and SSB modes. In FM mode, the signal is subject to 6dB/oct pre-emphasis by Q4 (1/2) : NJM4558S and is amplified by OP amplifier Q4 (2/2). Then, it is high-cut by active LPF (Low Pass Filter) Q9 for -24dB/oct via amplitude limiter D8 : MC911 and applied as modulation to the X'tal OSC in the IF unit.

In the SSB mode, the output from amplifier Q1 is impedance-converted by emitter-follower Q3 : 2SC2458(Y) and provided as modulation for the balanced modulator in the IF unit through the microphone gain control on the front panel. The input signal to pin AN1 of accessory terminal ACC2, in the SSB/CW mode is mixed with the output of microphone amplifier Q3 and is then input to the microphone gain control. In the FM mode, it is input to amplifier Q4, but not through the pre-emphasis circuit. Further, Q2 is controlled by the signal input to ACC2 pin MM to turn OFF amplifier Q1 for microphone muting.

### • Processor

When the processor SW is ON, the processor circuit consisting of Q5, Q6 and Q7 is connected through transistor switch Q8. Q5 is an amplifier circuit with ALC. The NFB (Negative Feedback) signal from Q5 pin 3 is amplified by Q7, detected by D5 and input for ALC at pin 6. Then, the input is controlled by ALC output pin 5.

Q6, an FET switch, adjusts the SSB level to that which has been previously adjusted in the FM mode.

### • Other circuits

Q11 is the AF PA. Transistor Q10 is an AF amplifier through which the signal is supplied to ACC2. Q12 is the CW side-tone OSC circuit. Q13-Q16 forms the CW semi-break-in circuit

## FINAL UNIT

(X45-1380-11) : TS-711, (X45-1390-XX) : TS-811

The drive signal from the RF unit is amplified up to 25W by power hybrid Q1 : M57727 (TS-711), Q2 : M57745 (TS-811). It is then supplied to the antenna through the ANT switch and the LPF for removal of harmonic component content.

In addition, ALC detection, RF meter, reflected Power detection and fan temperature detection circuits are provided. The RF meter circuit is a peak holding circuit in which voltage doubler detection is used. The final PA hybrid is protected in two ways. Reflected power (VSWR) is detected from the antenna circuit and lowers the drive voltage by control of the ALC reference voltage to prevent damage to the final PA hybrid for the second protection circuit, thermistor TH1 detects the Final unit temperature to control the fan and prevent abnormal heating in the Final unit PA.

## AVR UNIT (X43-1490-11)

The AVR (Automatic Voltage Regulator) unit consists of the rectifier and filter section and the AVR circuit section. The AVR circuit section has 13.8V, 8V and 9V AVR circuits and a temperature protection circuit. There is also a fan drive circuit.

The 13.8V AVR circuit consists of Q1-Q4 and pass transistor, Q5 : 2SD717. Transistor Q1, which controls Q5 emitter, supplies power (pin BB) which is separately rectified and filtered.

The fan is switched by comparator Q10 (1/2) and Q11 after heat detection by thermistor TH1 in the Final unit. The temperature protection circuit functions to stop transmission if the transformer heats abnormally due to excessive continuous transmission, etc. during AC operation. The detection circuit, like the fan, turns OFF the AVR 9T (9V, transmit) output.

## PLL UNIT (X50-1990-XX)

The PLL unit has a double loop configuration an output in 10Hz steps and uses a 10.24MHz TCXO (Temperature Compensates Crystal Oscillator) ( $\pm 3$ ppm) as the reference OSC. 10Hz step operation is achieved by dividing the output of the 2kHz comparison PLL (loop B) by a 1/200 divider. Digital tuning in 10Hz steps is obtained by mixing that division signal with the output of the 20kHz comparison PLL (loop A). In addition, the carrier OSC, which is located in the PLL unit, is configured to an IF shift.

Loop B is a mixing type PLL. The VCO output operates from 64-68MHz (Q28 : 2SK192A (GR)\*N) in loop B and, is mixed in Q31 : SN16931P with a 51.2MHz signal. This infection signal is derived by multiplying 10.24MHz 5 times in Q32 : 2SC2668(Y,O) via buffer amplifier Q29 : 2SC2668(Y) and then converting to 12.8-16.8MHz.

Then, the resultant signal is amplified in Q30 : TA7302 and divided at a frequency division coefficient of from: 6400-8400 so that a 2kHz output is obtained. Further, 10.24 MHz is also divided by 1/10 at Q36 and again divided by 1/5, and the resultant signal is phase compared with the 2kHz reference signal at Q21 : MC145155P\*K.

The PD (Phase Detector) output is converted to a DC Correction Voltage by a 3 transistor stage LPF (Q25-27 2SC2459(BL)) to control the VCO (Q28).

Additionally, part of the 64-68MHz VCO output which passed through buffer amplifier Q29 is subject to 1/2000 division by divider IC Q23 : M5449L for 1/1000 division, and Q22 : SN74LS90N for 1/2 division through buffer Q24 : 2SC260(Y,O). The output of Q22 therefore becomes 320-340kHz at a 10kHz step rate. This output and the output of the carrier OSC are input to mixer Q6 : SN16913P. A 11.025MHz output is taken through a ceramic filter and a buffer Q5 : 2SC2668(Y). Then, this 11.025MHz output is mixed at Q4 : SN16913P with a 20.48MHz signal which is obtained by multiplying 10.24 MHz by two at Q40 : 2SC2668(Y) so that an output of 31.505MHz is obtained. Then this 31.505MHz output is input to mixer Q3 : SN16913P as the loop A local OSC signal. Loop A is a dual modulus type PLL with a 20kHz comparison frequency. Prescaler Q20 :  $\mu$ PB555 operates at either a 1/16 or 1/17 division ratio. The VCO output 113.735-115.735MHz TS-711E, 113.735-117.735MHz TS-711A ( Q10 : 2SK129A(GR)• N) in loop A is separated into the HET (Heterodyne) output and the input to mixer Q3 : SN16913P through buffer Q11 : 2SC2668(Y). Mixer Q3 output (80-90MHz) is amplified in a 2 transistor stage amplifier (Q17, Q18 : 2SC2668(Y)) through a 80-95 MHz BPF and is input to prescaler Q20.

The prescaler, connected with PLL IC Q19, forms a swallow counter to divide this input at a frequency division coefficient NA = 4112-4212 (TS-711E), NA = 4112-4312 (TS-711A) to 20kHz. This signal is phase compared with the 20kHz reference signal obtained by dividing 10.24MHz by two, and 1/256 division of 5.12MHz. The PD output is DC converted by a 3 transistor LPF stage (Q12, 13, 14) to control the VCO (Q10). HET output is obtained by amplifying the VCO output (Q10) by transistor Q1 : 2SC2668(Y).

Comparison frequency derivation :

### • Loop A

The TCXO 10.24MHz output is amplified by two transistor stages (Q34, 35 : 2SC2458(Y)) via buffers (Q33, 38 : 2SC2458(Y)), is divided by Q36/2 to 5.12MHz, which in turn is input to PLL IC Q19. This input is divided 1/256 by the divider contained inside Q19 to 20kHz, which is the comparison frequency.

# CIRCUIT DESCRIPTION

### • Loop B

The 5.12MHz output in loop A is further divided 1/5 by divider Q36/2 to 1.024MHz. This signal is then input to PLL IC Q21 and is divided 1/512 by the divider contained inside Q21 to 2kHz, which is the comparison signal.

For unlock detection, the output of PLL IC Q19 pin 9 in loop A is used. The power supply to buffer Q1 is switched by transistors Q15 and Q16.

The carrier X'tal OSC is switched by diode switches D4 and D5. The bias voltage for D4 is applied from the 8C (8V DC common supply) line, and is independent of the mode. However, in the LSB mode, D4 and D5 can be selected by the ratios of R37/R38 and R40/R39.

Item	Rating
Center frequency of 3dB bandwidth	11.025MHz $\pm$ 50kHz
3dB attenuation bandwidth	Within 150 $\pm$ 40kHz
20dB attenuation bandwidth	380kHz or less
Insertion loss	8dB or less
Spurious (Within 9-12MHz)	38dB or more
Input and output impedance	330 $\Omega$

Table 6 Ceramic filter (L72-0346-05)  
(PLL unit L8, 10)

## HET UNIT

(X50-2000-00) : TS-811 M,X,T,W only  
(X50-2010-10) : TS-811 K type only

The HET unit gives the HET output by mixing the PLL VCO output and the local OSC signal, which is obtained by a 7 times multiplication of the 40.96MHz local OSC from the PLL unit. 40.96MHz from the PLL unit is amplified up to 0.5V (rms) by amplifier Q4. To remove unwanted harmonic components, it is low pass filtered by amplifier Q7 through a Hi-Q tuning circuit (stage Q6) to become the local OSC signal for HET section.

This signal is mixed with the PLL signal (113.015-123.015 MHz) in the Schottky barrier DBM (Double Balanced) diode mixer : ND-487 and converted to the actual HET signal of from 399.735-409.735MHz (TS-811B/E), 399.735-419.730MHz (TS-811A). After passing a 2-stage bandpass amplifier with small helical coils to obtain the necessary band-width, it is amplified up to the HET signal level by broad band amplifier Q3.



## TS-711/811



## CIRCUIT DESCRIPTION

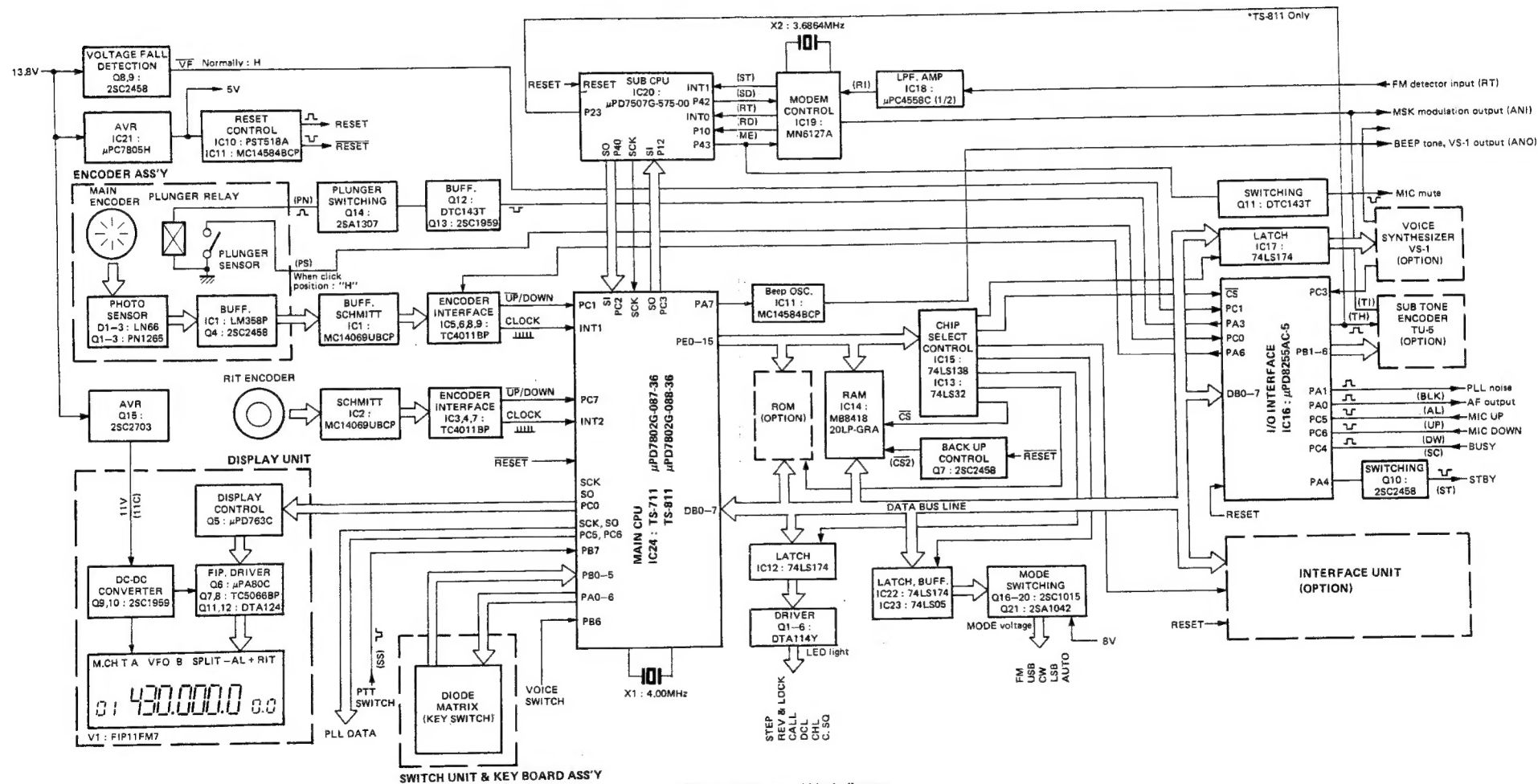


Fig. 5 Digital control block diagram

## CIRCUIT DESCRIPTION

## CONTROL UNIT (X53-1410-XX)

## • Basic configuration

Fig. 5 shows the block diagram of the digital control section. The microprocessor, which has an 8-bit (ROM, 6-kbyte) main CPU IC24 :  $\mu$ PD7802G-087-36 (TS-711),  $\mu$ PD7802G-088-36 (TS-811) and a 4-bit (ROM, 2-kbyte) sub CPU IC20 :  $\mu$ PD7507G-575-00, uses a CMOS RAM IC14 : MB847C-20LP-GRA with a capacity of 8 bits x 2kbytes as the external memory IC, the I/O interface IC IC16 :  $\mu$ PD8255AC-5 for I/O port extension and three 6-bit D-flip-flop ICs IC12, 17, 22 : 74LS174. In addition, it is provided with 24 pin IC socket for the external ROM for optional personal computer interface.

These ICs, connected in parallel with the data bus in the main CPU, exchange data with the main CPU synchronizes

by timing signals  $\overline{WR}$  or  $\overline{RD}$  from the main CPU, or the  $\overline{CS}$  signal from IC15. IC15, a 3 to 8 bit line decoder decodes inputs to address lines PE13--15 in the main CPU to generate the chip select signal ( $\overline{CS}$ ). In addition, IC13 takes an OR logic between signals  $\overline{CS}$  and  $\overline{WR}$  to supply the clock pulse to IC12, IC 17 and IC22, all of which are used as latches.

The main CPU controls the frequency, mode, offset, tone, display, memory, dial click mechanism, DCL system, voice synthesis, etc. and accepts interface with the sub CPU or an external personal computer.

The sub CPU, (common to the TM-211, -411, TR-2600, and TR-3600) interfaces with the main CPU or the MODEM, IC IC19, to handle digital signal code conversion and control tone ON/OFF and other such operation.

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	PA3	O	Output for plunger switching		21	PB3	O	Sub-tone frequency data output (T3)	
2	PA2	O	Unused (NC)		22	PB4	O	Sub-tone frequency data output (T4)	
3	PA1	O	PLL noise blanking pulse output (BLK)		23	PB5	O	Sub-tone frequency data output (T5)	
4	PA0	O	AF output mute (AL)		24	PB6	O	Sub-tone frequency data output (T6)	
5	$\overline{RD}$	I	Read strobe input		25	PB7	O	Unused (NC) : only in area T,W for TS-711/811, 1750Hz continuous tone control output (TH)	
6	$\overline{CS}$	I	Chip select input		26	Vcc		Power supply pin (+5V)	
7	GND		GND		27	D7	I/O	Data bus (D7)	
8	A1	I	Address bus (A1)		28	D6	I/O	Data bus (D6)	
9	A0	I	Address bus (A0)		29	D5	I/O	Data bus (D5)	
10	PC7	I	Unused (L)		30	D4	I/O	Data bus (D4)	
11	PC6	I	MIC DOWN switch input (UP)		31	D3	I/O	Data bus (D3)	
12	PC5	I	MIC UP switch input (DOWN)		32	D2	I/O	Data bus (D2)	
13	PC4	I	Busy input (SC)		33	D1	I/O	Data bus (D1)	
14	PC0	I	Plunger sensor input (PS) : "H" at click		34	D0	I/O	Data bus (D0)	
15	PC1	I	Low supply voltage detection input : "L" at less than about 9.5V		35	RESET	I	Reset input	
16	PC2	I	Unused (L)		36	$\overline{WR}$	I	Write strobe input	
17	PC3	I	Voice busy input (BY)		37	PA7	O	Unused (NC)	
18	PB0	O	Unused (NC)		38	PA6	O	Encoder pulse select output "H" at click	
19	PB1	O	Sub-tone frequency data output (T1)		39	PA5	O	Unused (NC)	
20	PB2	O	Sub-tone frequency data output (T2)		40	PA4	O	Standby (transmission) output : "H" in transmission	

Table 7 Function of  $\mu$ PD8255AC-5 (Control unit IC16)

CIRCUIT DESCRIPTION

● Key switch section

The key switches on the front panel are arranged in a diode matrix ( Fig. 6 ) and their signals are input to the main CPU in a key scan system. The switches, LEDs, RIT encoder, etc. on the front panel are electrically connected in the switch unit and sent to the control unit over simple wiring.

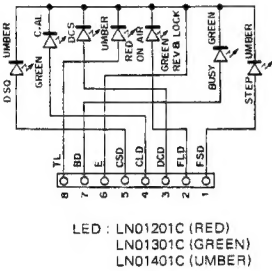
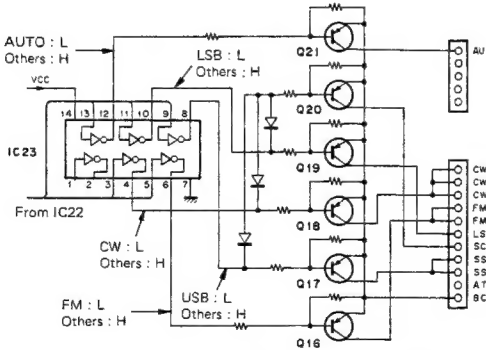


Fig. 6 Keyboard ass'y schematic diagram

● Display/mode control section

The fluorescent display section, a using custom IC : FIP11FM7, serially transfers the data corresponding to the display contents from the main CPU. The data transferred is 79 bits at power ON and 71 bits whenever the display contents change. The data is output by use of 3 pins SCK (clock), SO (data) and PCO (enable) from the main CPU when pin PCO is "L". After emission of all data bits, pin PCO is made "H". The "CALL", "STEP", "REV & LOCK", "DCL", "CHL", "C" and "SQ" LEDs each light by switching the latch output (active "L") of IC12 : 74LS174 via digital transistors Q1-Q6. Mode LED's light with the voltage for that mode. The voltage for each mode is produced by switching 8V by Q16-21 with the latch output (active "H") of IC22 : 74LS174 configured as an open-collector output by IC23 : 74LS05.



Normally Tr Q16-21 (base) voltage level is "H" and collector voltage level is "L". When MODE switch is turned to FM position, Q16 base is turned low to high level. Then, Tr Q16 is turned ON (collector is high level).

Fig. 7 MODE switching circuit

CIRCUIT DESCRIPTION

● DCS system control section

The processing of the digital control signal used in the DCS system is performed by the sub CPU (IC20 :  $\mu$ PD7507G-575-00), the MODEM process IC (IC19 : MN6127A) and IC18 :  $\mu$ PC4558C. In transmission, first, the data (digital code, call sign, idle channel) for the control signal is transferred to the sub CPU from the main CPU. In the sub CPU, logic transforms that data to NRZ (None Return to Zero) code, which is then output to IC19. It is subject to MSK (Minimum Shift Keying) modulation at IC19. Subsequently, that output is input to Q4 in the AF unit via pin ANI and is applied as

FM modulation. In reception, the signal which was subject to FM detection at discriminator L34 in the iF unit is input to IC18 from pin RT. IC18, an active filter, cuts off the high frequency component of this signal and also amplifies it up to the proper input level for IC19, and it is then output to IC19. At IC19, it is subject to MSK demodulation to NRZ code and is output to the sub CPU, in which it receives the reverse logic operation to that in transmission and is transferred to the main CPU. For the functions of IC pins used in this transfer, see Fig. 8 and Table 8, 9.

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	NC				27	NC			
2	P73	I	Unused (L)		28	P42	O	Transmission data output to IC19	
3	RESET	I	Reset input		29	NC			
4	NC				30	P43	O	IC19 enable output	
5	CL1		CR connection pin for clock pulse OSC		31	Vss		GND	
6	NC				32	X1		Unused (NC)	
7	VDD	I	Power supply pin (+5V)		33	VDD		Unused (NC)	
8	NC				34	X2		Unused (L)	
9	CL2		CR connection pin for clock pulse OSC		35	NC			
10	INT1	I	Clock pulse input for data transmission to IC19 (ST)		36	P20	O	Unused (NC)	
11	INT0	I	Clock pulse input for data reception from IC19 (RT)		37	P21	O	Unused (NC)	
12	SCK	O	Serial clock pulse output (for main CPU)		38	P22	O	Unused (NC)	
13	NC				39	P23			
14	NC				40	NC			
15	SO	O	Serial data output (for main CPU)		41	P10	I	Reception data input from IC19	
16	SI	I	Serial data input (for main CPU)		42	P11	I	Unused (H)	
17	P60	I	Unused (L)		43	P12	I	Communication request input from main CPU (IC20)	
18	P61	I	Unused (L)		44	P13	I	88.5Hz tone control input (connected to P23)	
19	P62	I	Unused (L)		45	NC			
20	P63	I	Unused (L)		46	P30	O	Unused (NC)	
21	P50	O	Unused (NC)		47	P31	O	Unused (NC)	
22	P51	O	Unused (NC)		48	P32	O	Unused (NC)	
23	P52	O	Unused (NC)		49	P33	O	Unused (NC)	
24	P53	O	Unused (NC)		50	P70	I	Setting of interface function for IC19, IC20 and IC24 (H)	
25	P40	O	Communication request output to main CPU (IC20)		51	P71	I	Setting of interface function for IC19, IC20 and IC24 (L)	
26	P41	O	Unused (NC)		52	P72	I	Setting of interface function for IC19, IC20 and IC24 (H)	

Table 8 Function of  $\mu$ PD7507G-575-00 (Control unit IC20)

## CIRCUIT DESCRIPTION

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	PE15	O	Address output for chip select (IC15), address bus		30	X2	—	Ceramic OSC connection pin	
2	Q OUT				31	X1	—	Ceramic OSC connection pin	
3	DB7	I/O	Data bus (D7)		32	Vss	—	GND	
4	DB6	I/O	Data bus (D6)		33	PA0	O	Key matrix output	
5	DB5	I/O	Data bus (D5)		34	PA1	O	Key matrix output (A1)	
6	DB4	I/O	Data bus (D4)		35	PA2	O	Key matrix output (A2)	
7	DB3	I/O	Data bus (D3)		36	PA3	O	Key matrix output (A3)	
8	DB2	I/O	Data bus (D2)		37	PA4	O	Key matrix output (A4)	
9	DB1	I/O	Data bus (D1)		38	PA5	O	Key matrix output (A5)	
10	DB0	I/O	Data bus (D0)		39	PA6	O	Key matrix output (A6)	
11	INT2	I	RIT clock pulse		40	PA7	—	Beep OSC control signal output	
12	INT1	I	Main encoder clock pulse		41	PB0	I	Key matrix input (A0)	
13	INT0	I	Interruption input for interface with personal computer (RDY)		42	PB1	I	Key matrix input (A1)	
14	WAIT	—	Unused (connected to Vcc)		43	PB2	I	Key matrix input (A2)	
15	M1	—	Unused (NC)		44	PB3	I	Key matrix input (A3)	
16	WR	O	Write strobe output for IC14, IC16 and IC13 (WR)		45	PB4	I	Key matrix input (A4)	
17	RD	O	Read strobe output for IC14 and IC16 (RD)		46	PB5	I	Key matrix input (A5)	
18	PC7	I	RIT UP/DOWN		47	PB6	I	Key matrix input (A6)	
19	PC6	O	2nd PLL (B loop) data latch (EB)		48	PB7	I	Standby (P.T.T.) input (SS)	
20	PC5	O	1st PLL (A loop) data latch (EA)		49	PE0	O		
21	PC4	O	Unused (NC)		50	PE1	O		
22	PC3	O	Communication request output to sub CPU (IC20)		51	PE2	O		
23	PC2	I	Communication request input from sub CPU (IC20)		52	PE3	O		
24	PC1	I	Main encoder UP/DOWN		53	PE4	O		
25	PC0	O	Enable output for display LSI (Q5 in display unit) (EB)		54	PE5	O		
26	SCK	I/O	Serial clock pulse I/O (Output for PLL, output for display IC, input for sub CPU)		55	PE6	O		
27	SI	I	Serial data input (for sub CPU)		56	PE7	O		
28	SO	O	Serial data output (for sub CPU, PLL and display IC)		57	PE8	O		
29	RESET	I	Reset pulse input		58	PE9	O		
					59	PE10	O		
					60	PE11	O		
					61	PE12	O	Unused (NC)	
					62	PE13	O	Address output for chip select (IC15)	
					63	PE14	O		
					64	Vcc	—	Power supply pin (+5V)	

Table 9 Function of  $\mu$ PD7802G-087-36 (Control unit IC24) TS-711  
Function of  $\mu$ PD7802G-088-36 (Control unit IC24) TS-811

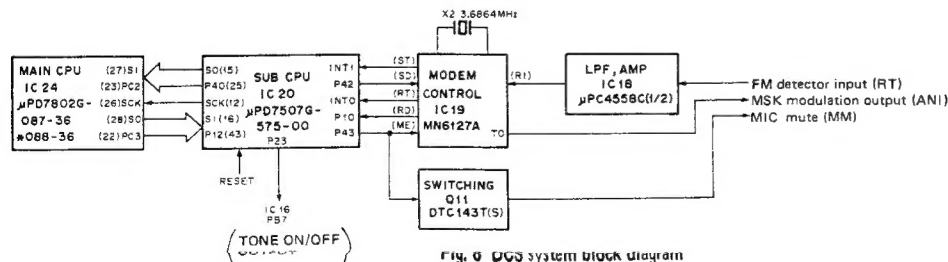


Fig. 9 DCS system block diagram

## CIRCUIT DESCRIPTION

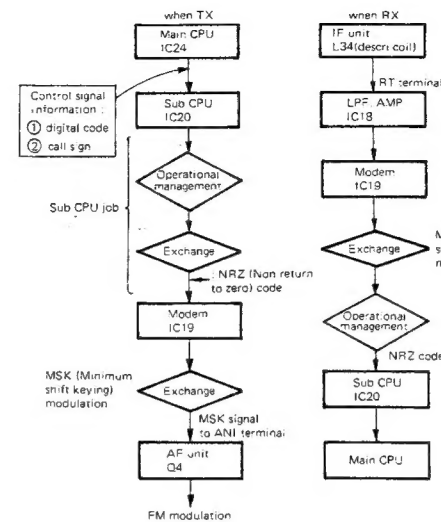


Fig. 9 DCS system flow chart

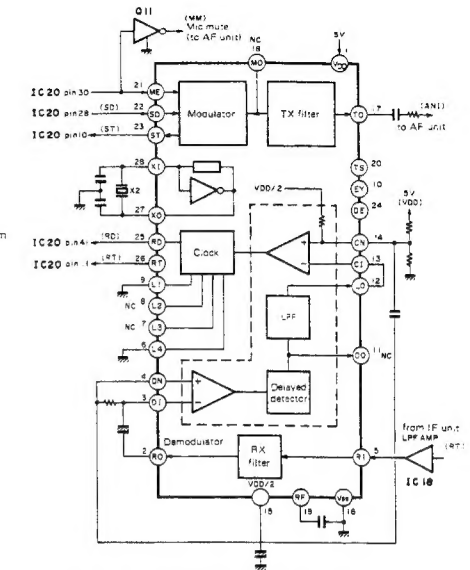


Fig. 10 Modem IC MN6127A block diagram (Control unit IC19)

## ● Reset and backup

A custom IC (IC10 : PST518A) (Fig. 11) is used to output the pre-determined reset pulse at power ON or momentary power failure. At IC10, the voltage in the 5V line is detected. When it becomes less than 4.2V, the open-collector output is turned ON, thus, "H" (RESET) and "L" (RESET) pulses of about 10msec are generated through a Schmitt trigger when resetting and applied to the reset pin of each IC. At power OFF, when Q8 and Q9 detect the supply line voltage (13.8V) is less than about 9.5V, the CPU returns the transceiver to the reception mode to stop all other processes. In addition, when the voltage at the 5V line becomes less than 4.2V, Q7 (normally ON) turns OFF to establish IC14 in the standby (backup) state.

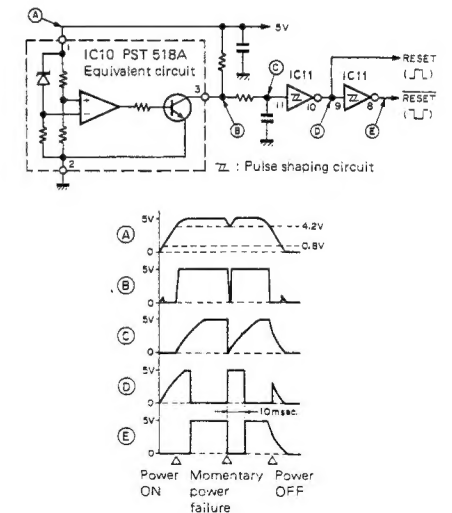


Fig. 11 Reset circuit and waveforms at respective points



CIRCUIT DESCRIPTION

● **"Beep" tone oscillator and voice synthesis control section**

For the "beep" tone output (including Morse Annunciation), its corresponding ON/OFF signal is output from the main CPU PA7 (pin 40) and is generated in oscillation circuit IC11 : MC14584BCP. It is then mixed with the audio output of the voice synthesizer (VS-1) and is input to the AF unit from pin ANC.

The control output (PSO-4, SR) of the voice synthesizer unit (option VS-1) is output from IC17 latch and the control input (BY) is input to IC16 PC3.

● **Encoder section**

Fig. 12 shows the configuration of the encoder section. The control pulse of the main dial "click" detent mechanism is as shown in Fig.13. When operating the [CH.Q], [CS], [VFO/M], [M=V], [SELECT], etc., keys, the CPU performs its associated process, judges whether or not the dial is detented, and inputs the status signal of the sensor (pin PS) to IC16 PCO (pin 14). For example, when the dial retent is activates, as when the dial is already detented when pin PS is "H", the process ends. However, when pin PS is "L", a 100msec pulse is emitted from PA3 IC16 pin 17, thereupon the plunger drive pulse (PN) is emitted through the switching operation of Q12 : DTC143T(S), Q13 : 2SC2459(Y) or Q14 : 2SA1307(Y).

After 100msec, the sensor status is checked. If it is "H", the process ends. However, it is found not "H", the process series is repeated. If it does not become "H" after this is repeated 7 times, the CPU stops the process, judging that the plunger section has a malfunction.

Out of waveforms EN1, EN2 and EN3 in the encoder, waveforms EN1 and EN2 are connected to four waveforms EN1, EN2, EN1 and EN2 in IC1 : MC14069UBCP. These four waveforms are combined with their respective differentiation waveforms and multiplied 4 times in IC5 and IC8 : TC4011. Output UP/DOWN and a clock pulse are generated in IC8 and IC9 : TC4011 and are entered to the main CPU PC1 (pin 24) and INT1 (pin 12). In the detent mode, the Schmitt trigger differentiation waveform output of EN3 is selected in IC9 and is taken as the clock pulse. RIT encoder waveform chatter is absorbed at Schmitt trigger IC2, and waveforms E1 and E2 are combined with their inversion waveforms and differentiation waveforms. They are then multiplied 4 times at IC4 and IC7, from which signal UP/DOWN and clock pulse outputs are produced and entered to PC7 and INT2 of the main CPU.

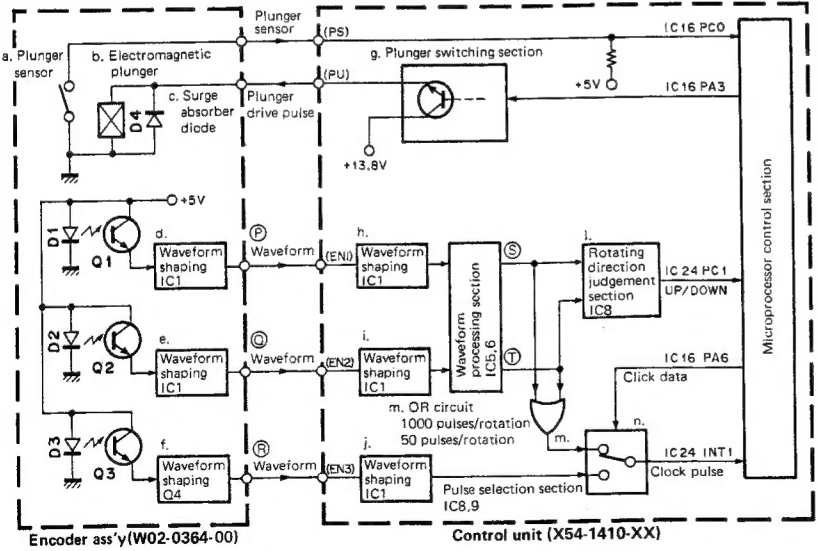


Fig. 12 Configuration of encoder processing section

CIRCUIT DESCRIPTION

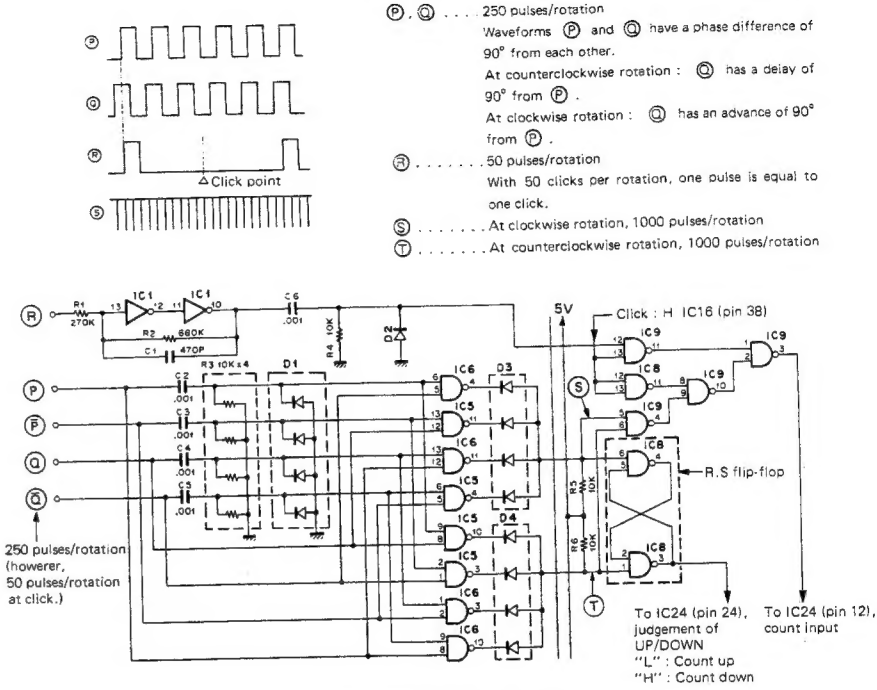


Fig. 13 Output waveform of main encoder

● **Other I/O sections**

a. Standby (ST) output :  
The P.T.T. switch ON/OFF signal (ST) from pin SS is taken in PB7 of the main CPU. In transmission, Q10 (open-collector) is thus switched with IC16 PA4 (pin 40) "H".

In auto-transmission in the DCL system, the ON/OFF control for Q10 is also generated in the main CPU to control transmission and reception along with a personal computer.

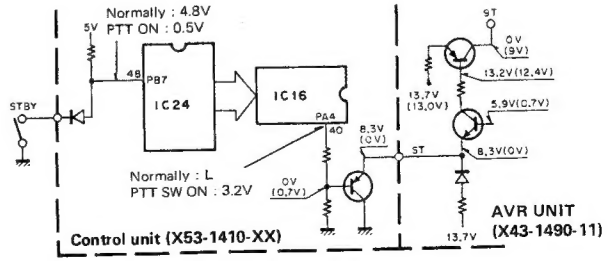
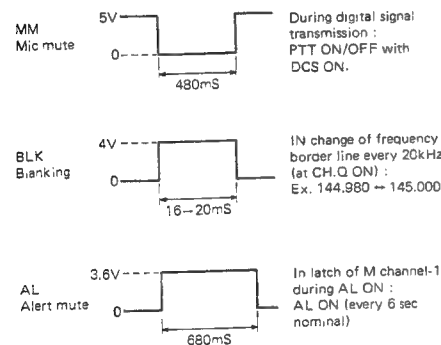


Fig. 14 STBY output circuit

## CIRCUIT DESCRIPTION

- b. PLL select switching noise blanking output :  
When the data in PLL loop A (in 20kHz steps) changes, the timing pulse (BLK) in synchronization with the data output is output from IC16 PA1 (pin 3). Q37 in the IF unit switches to momentarily mute the PLL select switching noise.
- c. Busy (SC) input :  
In scan mode operation, the SC signal corresponding to busy lamp status is input to IC16 PC4 (pin 13) to select between "open" or "busy".
- d. Microphone UP/DOWN switch :  
These are input to IC16 PC5 or PC6 after chatter filtering. (The following are for DCL system control.)
- e. Microphone mute (MM) output :  
This signal cuts off microphone audio during digital signal transmission. This signal, which is output to IC19 from P43 of the sub CPU, controls Q11 (open-collector) to switch Q2 in the AF unit.
- f. Audio mute (AL) output :  
This mutes the audio output by making IC16 PA0 "H" in code squelch operation, during retrieval of an idle channel or in memory channel check during alert operation.

## Connector ④



## Connector ⑨

- RT . . . . In reception of standard modulation signal (1kHz ± 3kHz deviation, 60dBμ) → 100mVp-p (36mVrms)
- ANI . . . . In transmission of digital signal, PTT ON/OFF at DCS ON → 80mVp-p.
- BZ . . . . In output of beep sound, M.IN pressed → 22mVp-p.
- TO . . . . In output of 88.5Hz tone (0.6kHz deviation) → 420mVrms

Fig. 15 Waveforms at ④ and ⑨ I/O pins  
(With harness connected)

## Encoder ass'y (W02-0364-00)

## ● Encoder section

An IR (Infrared) output is taken through a 250 slit/rotation disk is detected at phototransistors Q1 and Q2. These detection signals are each waveform-shaped at comparator IC1 and emitted to pins EN1 and EN2. Then, they are adjusted by VR1 and VR2 so that they have a precise phase difference of 90° from each other with a precise duty cycle of 50%.

An IR output which is taken through 50 slit/rotation disk is detected at phototransistor Q3. The detection signal is amplified at Q4 and emitted to pin EN3. Signal EN3 is extracted without adjustment. Fig. represents each output waveform.

## ● Detent : electromagnetic plunger section

Whenever the plunger relay is turned ON and then OFF by the Control unit control pulse (pin PN), the detent mode changes to the slow (continuous tuning) mode or vice versa. Normally, the plunger relay is OFF. In addition, the plunger sensor switch is OFF (open) at the detent mode and ON (closed) at the slew mode.

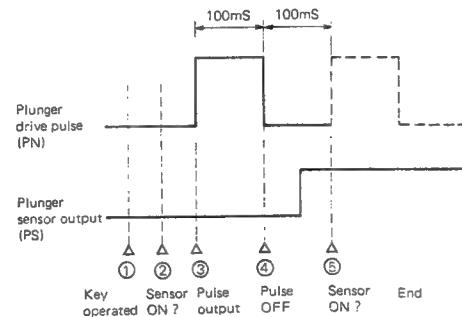


Fig. 16 Relationship between plunger drive pulse and sensor

## CIRCUIT DESCRIPTION

## DISPLAY UNIT (X54-1820-11)

## ● Display section

When display data is transferred on its 3 lines : DD (data) CD (clock) and ED (enable) from the control unit, they are input to the display control IC Q5 :  $\mu$ PD763C. Q5 outputs both digit signals (T0-T11) and segment signals (Sa-Sg, IO,I1) for dynamic display lighting. (Table 10). The digit

and segment signals are driven by Q7 and Q8, and by Q6, Q11 and Q12 so display tube (V1) lights. Q7, Q8, Q6 and Q11 switch about -23V and +5V. Specifically, Q12 switches about -23V and +11V, as it drives the red character segments. In addition, Q9 and Q10, which are a DC-DC converter oscillator circuit, produce negative voltages for the display tube and AGC circuits.

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	X2		IFT connect pin for clock pulse OSC		15	IO	O	Segment signal Character	
2	T0	O	Digit signal RIT 10° Hz digit		16	I1	O	Segment signal Decimal point	
3	T1	O	Digit signal RIT 10¹ Hz digit		17	Sa	O	Segment signal a	
4	T2	O	Unused (NC)		18	Sb	O	Segment signal b	
5	T3	O	Digit signal 10² Hz digit		19	Sc	O	Segment signal c	
6	T4	O	Digit signal 10³ kHz digit		20	Sd	O	Segment signal d	
7	T5	O	Digit signal 10⁴ kHz digit		21	Se	O	Segment signal e	
8	T6	O	Digit signal 10⁵ kHz digit		22	Sf	O	Segment signal f	
9	T7	O	Digit signal 10⁶ MHz digit		23	Sg	O	Segment signal g	
10	T8	O	Digit signal 10⁷ MHz digit		24	CS	I	Chip select input	
11	T9	O	Digit signal 10⁸ MHz digit		25	SCR	I	Serial clock pulse input	
12	T10	O	Digit signal M.CH 10⁹ digit		26	SI	I	Serial display data input	
13	T11	O	Digit signal M.CH 10¹ digit		27	Vcc		Power supply pin (+5V)	
14	GND		GND		28	X1		For clock pulse OSC	

Table 10 Function of  $\mu$ PD763C (Display unit Q5)

PARTS LIST

CAPACITORS CC 45 TH 1H 220 J  
1 2 3 4 5 6  
1 = Type ..... ceramic, electrolytic, etc. 4 = Voltage rating  
2 = Shape ..... round, square, etc. 5 = Value  
3 = Temp. coefficient 6 = Tolerance

• Temperature Coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word G H J K L  
ppm/°C ± 30 ± 60 ± 120 ± 250 ± 500

• Tolerance

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+40	+80	+100	More than 100
						-20	-20	-20	-0	Less than 100

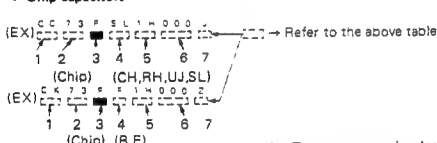
Example CC45TH = -470 ± 60 ppm/°C

Less than 10 pF

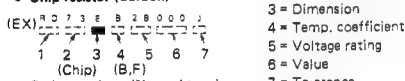
• Rating voltage

1st word	2nd word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	—	—
1	10	12.5	16	20	25	31.5	40	50	63	80	35	—
2	100	125	160	200	250	315	400	500	630	800	—	—
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	—	—

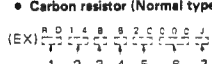
• Chip capacitors



• Chip resistor (Carbon)



• Carbon resistor (Normal type)



Dimension

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

Rating wattage

Cord	Wattage	Cord	Wattage	Cord	Wattage
2A	1 10W	2E	1 4W	3A	1W
2B	1 8W	2H	1 2W	3D	2W
2C	1 6W				



SEMICONDUCTOR (TS-711A/E)

N : New parts  
• Please note that parts are sometimes not in stock and it takes much time to deliver.

Item	Part No.	Item	Part No.	Item	Part No.
Diode	1N60 1S1587 1SS101 1SS133 1SV50 1SV123 DAP401 MA856 MC911 MC921 MC931 MI308 MI407 ND487C1-3R U058 V068	Resistor block	S10VB20	IC	BU4011B LM358P M5L8255AP-5 M54459L MB3713 MB8418-20LP-GRA MC14069UBCP MC14584BCP MC145155P* K MC145156P MN6127A NJM78L05A NJM4558S NE555P NJM78L05A NJM4558S PST518A SN74LS05N SN74LS32N SN74LS90N SN74LS138N SN74LS174N TA7302P TC4011BP TC4069UBP TC5066BP
Photo TR	PN126S(R)	Photo TR	DTA114Y(S) DTA124EF DTC114E(S) DTC143T(S)	IC	μPA80C μPB555C μPC78M08H μPC577H(E,F) μPC1158H2 μPC4558C μPC7805H μPD763C μPD7507G-575-00 μPD7802G-087-36 μPD8255AC-5
Digital TR	N	Digital TR	2SA1012(Y) 2SA1015(Y) 2SA1048(Y) 2SA1115(E) 2SA1307(Y) 2SC1815(Y) 2SC1959(Y) 2SC2240(GR) 2SC2358-22-A 2SC2458(Y) 2SC2459(BL) 2SC2459(GR) 2SC2538-22-A 2SC2668(Y) 2SC2668(Y,O) 2SC2703(O,Y) 2SC2787(L) 2SC3113(B) 2SD717(O,Y)	TR	2SK30A(GR) 2SK30A(O) 2SK125 2SK161(GR) 2SK192A(GR)*N 3SK73(GR) 3SK73(Y) 3SK122(L) 3SK129(Q,R)
Vari-cap	1S2208	TR	N	Power module	M57727
Varistor	VD1223	FET	N		
Zener diode	MTZ6.2JA MTZ6.2J(A,B) MTZ7.5JA MTZ8.2J(B,C) MTZ9.1JB MTZ12JB	LED	N		
LED	LN66(R) LN01201C LN01301C LN01401C	Disply tube	FIP11FM7		
Thermister	112-102-2 112-103-2 112-351-2 SDT1000F				

ENCODER ASS'Y (W02-0364-00)

PART. NO	NAME & DESCRIPTION	Q'TY	REFERENCE. NO
CE04CW0J330M	ELECTRO 33 6.3V	1	C1
LM358P	IC	1	IC1
LN66(R)	LED	3	D1, 2, 3
RD148B2C102J	RES. CARBON 1kΩ	2	R5, 10
RD148B2C105J	RES. CARBON 1MΩ	2	R8, 13
RD148B2C181J	RES. CARBON 180Ω	3	R1, 2, 3
RD148B2C182J	RES. CARBON 1.8kΩ	4	R6, 7, 11, 12
RD148B2C222J	RES. CARBON 2.2kΩ	1	R15
RD148B2C472J	RES. CARBON 4.7kΩ	4	R4, 9, 14, 16
R12-2413-05	TRIM. POT. 5kΩ	2	VR1, 2
R92-0150-05	SHORT JUMPER	2	
PN126S	PHOTO TR	3	Q1, 2, 3
V068	DIODE	1	D1
2SC2458(Y)	TR	1	Q4

# TS-711A/E PARTS LIST

## TS-711A/E GENERAL

TS-711A/E GENERAL			DISTINCTION & QUANTITY						REFERENCE NO	
PART NO	NOTE	NAME & DESCRIPTION	011	021	022	051	061	071		
A01-0979-02	N	CASE(A) UPPER	1	1	1	1	1	1		
A01-0980-02	N	CASE(B) LOWER	1	1	1	1	1	1		
A20-2524-03	N	FRONT PANEL	1	1	1	1	1	1		
B05-0708-04		SP GRILE	1	1	1	1	1	1		
B10-0668-04	N	FRONT GLASS	1	1	1	1	1	1		
B30-0817-15		LAMP 14V 80MA	1	1	1	1	1	1		
B31-0655-05	N	METER	2	2	2	2	2	2		
B39-0407-04		SPACER	1	1	1					
B40-3524-04	N	MODEL NAME PLATE TS-711A				1	1			
B40-3525-04	N	MODEL NAME PLATE TS-711E						1		
B40-3524-04	N	MODEL NAME PLATE TS-711A								
B41-0134-04	N	CAUTION LABEL	1	1	1	1	1	1		
B42-2356-04	N	SWITCH LABEL DCS	1	1	1	1	1	1		
B42-1739-04		VOLTAGE INDICATING PLATE 120V		1	1					
B42-1740-04		VOLTAGE INDICATING PLATE 220V				1				
B42-1741-04		VOLTAGE INDICATING PLATE 240V					1			
B42-1740-04		VOLTAGE INDICATING PLATE 220V						1		
B42-1741-04		VOLTAGE INDICATING PLATE 240V				1	1	1		
B42-2364-04	N	CURRENT INDICATING PLATE 6A	1	1	1	1	1	1		
B43-1022-04	N	BADGE	1	1	1					
B43-1023-04	N	BADGE				1		1		
B43-1024-04	N	BADGE						1		
B43-1022-04	N	BADGE								
B46-0410-00		WARRANTY CARD	1	1	1					
B50-4148-00	N	INSTRUCTION MANUAL				1				
B50-4149-00	N	INSTRUCTION MANUAL						1	1	
B50-4148-00	N	INSTRUCTION MANUAL								
C91-0496-05		CERAMIC FOR AC 470P	2	2	2	2	2	2		
C91-0647-05		CERAMIC FOR AC 0.01	1	1	1	1	1	1		
D09-0306-04	*	ENCODER DISC ROTOR	1	1	1	1	1	1		
D09-0307-04	*	ENCODER DISC STATOR	1	1	1	1	1	1		
D40-0627-05	N	DETECTOR MECHANISM UNIT	1	1	1	1	1	1		
E07-1351-05	N	13P PLUG (ACC)	1	1	1	1	1	1		
E07-0852-05		VOLTAGE SELECTOR PLUG		1	1	1	1	1		
E08-0474-05	N	4P SOCKET DC	1	1	1	1	1	1		
E09-0472-05	N	4P PLUG DC	1	1	1	1	1	1		
E12-0001-15		PHONE PLUG (ACS)	1	1	1	1	1	1		
E12-0401-15		PHONE PLUG (ACS)	1	1	1	1	1	1		
E18-0351-05		3P AC SOCKET	1	1	1	1	1	1		
E29-0463-05		1P JUNCTION CONNECTOR	1	1	1	1	1	1		
E30-1643-15		AC CABLE (ACS)	1	1	1					
E30-1644-15		AC CABLE (ACS)				1				
E30-1645-05		AC CABLE (ACS)					1	1		
E30-1647-05		AC CABLE (ACS)								
E31-3049-05	N	CABLE WITH TERMINAL	1	1	1	1	1	1		
E31-3091-05	N	CABLE WITH TERMINAL HET	1	1	1	1	1	1		
E31-3064-00	N	WIRE'S KIT (ACS)	1	1	1	1	1	1		
F05-2023-05		FUSE 2A	1							
F05-1023-05		FUSE 1A		1	1	1	1	1		
F05-2023-05		FUSE 2A		1	1					
F07-0858-03	N*	HEAT SINK COVER	1	1	1	1	1	1		
F10-1206-04		SHIELDING PLATE	1	1	1	1	1	1		

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY							REFERENCE.NO
			011	021	022	051	061	071		
F15-0655-04	N*	BLINDING PLATE	1	1	1	1	1	1		
F20-0521-04		INSULATING PLATE	1	1	1	1	1	1		
G01-0818-04		COILED SPRING	5	5	5			5		
G01-0818-04		COILED SPRING				4	4			
G02-0505-05		KNOB FITTING SPRING	3	3	3	3	3	3		
G13-0649-04		CUSHION FOR METER	2	2	2	2	2	2		
G13-0642-04		CUSHION FOR PLL	1	1	1	1	1	1		
G53-0510-04		PACKING FOR PANEL	1	1	1	1	1	1		
H01-4573-04	N	CARTON(INSIDE)	1	1	1					
H01-4574-04	N	CARTON(INSIDE)				1				
H01-4621-04	N	CARTON(INSIDE)						1		
H01-4573-04	N	CARTON(INSIDE)	1	1	1					
H03-2200-04	N	CARTON(OUTSIDE) TS-711A								
H03-2230-04	N	CARTON(OUTSIDE) TS-711E				1	1			
H03-2200-04	N	CARTON(OUTSIDE) TS-711A						1		
H10-2596-02	N*	PACKING FIXTURE	1	1	1	1	1	1		
H10-2597-02	N*	PACKING FIXTURE	1	1	1	1	1	1		
H12-1315-04		BUFFER	1	1	1	1	1	1		
H20-1425-03	N	PROTECTION COVER	1	1	1	1	1	1		
H25-0029-04	*	BAG(ACS) 60X110	1	1	1	1	1	1		
H25-0105-04	*	BAG 150X350	1	1	1	1	1	1		
H25-0103-04		BAG 125X250		1	1	1	1	1		
J02-0323-05		FOOT CASE(B)	4	4	4	4	4	4		
J02-0407-04		FOOT CASE(B)	1	1	1	1	1	1		
J02-0403-04		FOOT CASE(SIDE)	4	4	4	4	4	4		
J21-2573-04		FOOT HARDWARE	2	2	2	2	2	2		
J29-0407-04		SW GUIDE A (TACT KNOB)	5	5	5			5		
J29-0407-04		SW GUIDE A (TACT KNOB)				4	4			
J31-0141-04		COLLAR MIC	1	1	1	1	1	1		
J42-0442-05	N	HOLE BUSH ACC1	1	1	1	1	1	1		
J61-0404-05		FASTNER FOR DC PLUG	1	1	1	1	1	1		
J61-0408-05		VINYL TIE	6	6	6	6	6	6		
K01-0410-05		HANDLE CASE(B)	1	1	1	1	1	1		
K21-0768-04		MAIN KNOB	1	1	1	1	1	1		
K23-0776-04	N	ROUND KNOB RIT	1	1	1	1	1	1		
K23-0710-04		KNOB UP/DOWN	3	3	3	3	3	3		
K27-0467-04		KNOB	2	2	2	2	2	2		
K29-0771-04		MAIN TUNING KNOB	1	1	1	1	1	1		
K29-0741-04		KNOB	3	3	3	3	3	3		
K29-0758-04		KNOB POWER	1	1	1	1	1	1		
K29-3001-04		KNOB NB	5	5	5	5	5	5		
K29-3032-04	N	TACT KNOB RIT.TONE	5	5	5			5		
K29-3032-04	N	TACT KNOB RIT.TONE				4	4			
L01-8226-05	N	POWER TRANSFORMER	1	1	1	1	1	1		
N09-0646-04		SCREW M4X4	2	2	2	2	2	2		
N16-0040-46		SPRING WASHER	1	1	1	1	1	1		
N30-2604-46		PAN HD SCREW	2	2	2	2	2	2		
N30-3004-46		PAN HD SCREW	2	2	2	2	2	2		
N30-3010-46		PAN HD SCREW				1	1			
N30-3006-46		PAN HD SCREW	2	2	2	2	2	2		
N32-2604-46		FLAT HD SCREW	6	6	6	6	6	6		

# PARTS LIST TS-711A/E

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY							REFERENCE NO
			011	021	022	051	061	071		
N32-2606-46		FLAT HD SCREW	6	6	6	6	6	6		
N32-3004-46		FLAT HD SCREW	2	2	2	2	2	2		
N32-3006-46		FLAT HD SCREW	2	2	2	2	2	2		
N33-3006-41		ROUND FLAT SCREW	4	4	4	4	4	4		
N33-3006-45		ROUND FLAT SCREW	4	4	4	4	4	4		
N35-2604-46		BIND SCREW	11	11	11	11	11	11		
N35-3004-41		BIND SCREW	18	18	18	18	18	18		
N35-3008-46		BIND SCREW	2	2	2	2	2	2		
N87-2605-46		TAPPING SCREW	38	38	38	38	38	38		
N87-3006-46		TAPPING SCREW	10	10	10	10	10	10		
N87-3010-41		TAPPING SCREW	6	6	6	6	6	6		
N87-4006-46		TAPPING SCREW	3	3	3	3	3	3		
N87-3006-41		TAPPING SCREW	4	4	4	4	4	4		
N87-4008-46		TAPPING SCREW	1	1	1	1	1	1		
N88-2606-46		FLAT TAPPING SCREW	2	2	2	2	2	2		
N88-3006-46		FLAT TAPPING SCREW	2	2	2	2	2	2		
N89-3006-45		BIND TAPPING SCREW	4	4	4	4	4	4		
SDT1000F		THERMISTOR	1	1	1	1	1	1		
S29-2409-05	N	VOLTAGE SELECTOR SWITCH	1	1	1	1	1	1		
S31-1415-05	N	SLIDE SWITCH	1	1	1	1	1	1		
S40-2450-05	N	PUSH SWITCH	1	1	1	1	1	1		
S50-1406-05	N	TACT SWCH(UP,DOWN)	2	2	2	2	2	2		
S59-0428-05	N	KEYBOARD ASS'Y DCS	1	1	1	1	1	1		
T03-0027-15		SPEAKER	1	1	1	1	1	1		
T91-0331-05		MICROPHONE (M,W)	1	1	1	1	1	1		
T91-0335-05		MICROPHONE (T)	1	1	1	1	1	1		
T91-0331-05		MICROPHONE (M,W)	1	1	1	1	1	1		
T94-0049-05	N	PLANGER	1	1	1	1	1	1		
W02-0364-00	N	ENCODER ASS'Y	1	1	1	1	1	1		
W09-0326-05		LITHIUM BATTERY	1	1	1	1	1	1		
X41-1580-11	N	SWITCH UNIT	1	1	1	1	1	1		
X41-1580-61	N	SWITCH UNIT	1	1	1	1	1	1		
X41-1580-11	N	SWITCH UNIT	1	1	1	1	1	1		
X43-1490-11	N	AVR UNIT	1	1	1	1	1	1		
X44-1620-11	N	RF UNIT	1	1	1	1	1	1		
X44-1620-01	N	RF UNIT	1	1	1	1	1	1		
X44-1620-11	N	RF UNIT	1	1	1	1	1	1		
X45-1380-11	N	FINAL UNIT	1	1	1	1	1	1		
X48-1400-11	N	IF UNIT	1	1	1	1	1	1		
X48-1400-00	N	IF UNIT	1	1	1	1	1	1		
X48-1400-11	N	IF UNIT	1	1	1	1	1	1		
X49-1180-00	N	AF UNIT	1	1	1	1	1	1		
X50-1990-11	N	PLL UNIT	1	1	1	1	1	1		
X50-1990-00	N	PLL UNIT	1	1	1	1	1	1		
X50-1990-11	N	PLL UNIT	1	1	1	1	1	1		
X52-1290-60	N	TONE UNIT	1	1	1	1	1	1		
X53-1410-11	N	CONTROL UNIT	1	1	1	1	1	1		
X53-1410-21	N	CONTROL UNIT	1	1	1	1	1	1		
X53-1410-51	N	CONTROL UNIT	1	1	1	1	1	1		
X53-1410-61	N	CONTROL UNIT	1	1	1	1	1	1		
X53-1410-21	N	CONTROL UNIT	1	1	1	1	1	1		
X54-1820-11	N	DISPLAY UNIT	1	1	1	1	1	1		

## SWITCH UNIT (X41-1580-XX) (-11 : K,M1,M2,X -61 : T,W)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY							REFERENCE NO
			011	061	062					
C91-0757-05		CERAMIC 0.001 50V	5	5						C , 1, 2, 3, 4, 7
C91-0757-05		CERAMIC 0.001 50V			7					
E04-1351-05	N	ROUND TYPE CONNECTOR 13P	1	1						
E40-5041-05	N	MINI CONNECTOR 5P	2	2						
E40-5042-05	N	MINI CONNECTOR 8P	1	1						
E40-5043-05	N	MINI CONNECTOR 12P	1	1						
E40-0273-05	*	MINI CONNECTOR 2P	1	1						
E40-0573-05	*	MINI CONNECTOR 5P	1	1						
E40-0673-05	*	MINI CONNECTOR 6P	2	2						
E40-0873-05	*	MINI CONNECTOR 8P	1	1						
E40-0973-05	*	MINI CONNECTOR 9P	1	1						
E40-1373-05	*	MINI CONNECTOR 13P	1	1						
RS14AB3A100J		METAL FILM 10 OHM 1W	1	1						R , 3
S40-2440-15		PUSH SW	4	4						S , 3, 10, 11, 12
S40-2441-15		PUSH SW	1	1						S , 4
S50-2402-05		TACT SWITCH	2	2						S , 5, 6
S50-1412-05		TACT SWITCH	5							S , 1, 2, 7, 8, 9
S50-1412-05		TACT SWITCH		4						S , 1, 2, 7, 9
W02-0365-05	N	ROTARY ENCODER(RIT)	1	1						
1SS133		DIODE	8	8						D , 1, 2, 3, 4, 5, 6, 7, 8



# TS-711A/E PARTS LIST

## AVR UNIT (X43-1490-11)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE.NO
			011										
CE04W1C100M		ELECTRO 10 16V	4										C 8, 9, 12, 20
CE04W1C101M		ELECTRO 100 16V	1										C 10
CK45B1H102K		CERAMIC 1000P 50V	10										C 5, 7, 11, 14, 15, 17, 18
													C 24, 25, 26
C90-2004-05	N	ELECTRO 15000 25V	2										C 1, 2
C90-2005-05	N	ELECTRO 1000 25V	2										C 3, 4
C90-0817-05		ELECTRO 1000 16V	1										C 22
C90-0820-05		ELECTRO 470 16V	3										C 19, 21, 23
C91-0117-05		CERAMIC 0.01 50V	1										C 16
C91-1008-05		CERAMIC 0.022 50V	1										C 13
C91-0119-05		CERAMIC 0.047 50V	1										C 6
DT114ES		DIGITAL TR	1										Q 12
E08-0373-05	*	MINI CONNECTOR 3P	1										
E31-3063-05	*	INSIDE CONNECTING WIRE	1										
E40-5044-05	N*	MINI CONNECTOR 2P	1										
E40-5045-05	N*	MINI CONNECTOR 6P	1										
E40-0273-05	*	MINI CONNECTOR 2P	2										
E40-0473-05	*	MINI CONNECTOR 4P	1										
E40-0673-05	*	MINI CONNECTOR 6P	1										
E40-0773-05	*	MINI CONNECTOR 7P	1										
E40-0973-05	*	MINI CONNECTOR 9P	1										
F20-0078-05		INSULATING PLATE	2										
F29-0014-05		INSULATING WASHER	2										
J13-0055-05		FUSE HOLDER	2										
J19-0306-05		HOLDER	1										
L15-0016-05		LOW-FREQUENCY COIL	2										L 1, 2
MT26-2J(A,B)		ZENER DIODE 6.2V	1										D 6
MT28-2J(B,C)		ZENER DIODE 8.2V	1										D 5
NJ4558S		IC	1										Q 10
R12-1429-05		TRIM.POT. 500 OHM	1										VR 1
R12-1428-05		TRIM.POT. 1K OHM	1										VR 2
R92-0674-05	N	RESISTOR BLOCK 10 OHM 2W	2										R 16, 17
S10VB20		RESISTOR BLOCK	1										D 1
UPC78M08H		IC	1										Q 8
J05B		DIODE	1										D 4
VD1223		VARISTOR	1										D 7
V06B		DIODE	2										D 2, 3
1SS133		DIODE	2										D 8, 9
2SA1012(Y)		TR	2										Q 1, 5
2SA1048(Y)		TR	1										Q 7
2SC1959(Y)		TR	3										Q 2, 9, 11
2SC2458(Y)		TR	3										Q 3, 4, 6

## RF UNIT (X44-1620-XX) (-01 : T,W -11 : K,M1,M2,X)

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE.NO
			001	011									
CC45CH1H0R5C		CERAMIC 0.5P 50V	1	1									C 40
CC45CH1H120J		CERAMIC 12P 50V	2	1									C 27, 28
CC45CH1H120J		CERAMIC 12P 50V	1	1									C 27
CC45CH1H080D		CERAMIC 8P 50V	1	1									C 38
CC45CH1H150J		CERAMIC 15P 50V	2	2									C 8, 56
CC45CH1H100D		CERAMIC 10P 50V	4	2									C 12, 23, 24, 49
CC45CH1H100D		CERAMIC 10P 50V	1	1									C 12
CC45CH1H220J		CERAMIC 22P 50V	1	1									C 44
CC45CH1H330J		CERAMIC 33P 50V	4	4									C 14, 20, 21, 22
CC45SL1H101J		CERAMIC 100P 50V	1	1									C 1, 47
CC45CH1H010C		CERAMIC 1P 50V	2	2									C 9, 36
CC45CH1H010C		CERAMIC 1P 50V	1	1									C 9
CC45CH1H020C		CERAMIC 2P 50V	2	2									C 37, 41
CC45CH1H030C		CERAMIC 3P 50V	2	2									C 10, 34
CC45CH1H060D		CERAMIC 6P 50V	1	1									C 13
CC45CH1H080D		CERAMIC 8P 50V	2	2									C 33, 42
CC73ECH1H070D		CHIP CAP. 7P 50V	1	1									C 30
CE04W1C100M		ELECTRO 10 16V	1	1									C 54
CK73EB1H102K		CHIP CAP. 1000P 50V	5	5									C 7, 29, 35, 43, 55
C05-0030-15		TRIMMER 20P	1	1									TC 2
C05-0031-15		TRIMMER 10P	1	1									TC 1
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO	3	3									
L31-0180-05		TUNING COIL	1	1									L 15
L31-0267-05		TUNING COIL	2	2									L 16, 17
L34-0884-05		TUNING COIL	1	1									L 14
L34-2035-05		TUNING COIL	1	1									L 6
L34-2038-05		TUNING COIL	3	3									L 3, 5, 10
L34-0893-05		COIL 3 4T	2	2									L 19, 21
L34-0894-05		COIL 3 5T	2	2									L 18, 20
L34-0908-05		COIL 3 9.5T	1	1									L 11
L40-1092-14		INDUCTOR 1 UH	1	1									L 22
L40-1011-14		INDUCTOR 100 UH	2	2									L 7, 8
L40-4711-13		INDUCTOR 470 UH	1	1									L 23
L40-1001-13		INDUCTOR 10 UH	1	1									L 24
L40-1091-03		INDUCTOR 1 UH	1	1									L 9
L71-0248-05	N	MCF 30.265MHZ	1	1									L 4
L79-0642-05	N	HELICAL BLOCK	1	1									L 1
L79-0643-05	N	HELICAL BLOCK	1	1									L 1
L79-0498-15		HELICAL	1	1									L 2
L79-0499-05		HELICAL	1	1									L 2
M4856		DIODE	2	2									D 1, 2
S51-1420-05		RELAY	1	1									RL 1
1SS133		DIODE	1	1									D 9
1SS133		DIODE	1	1									D 8
1SV123		DIODE	5	5									D 3, 4, 5, 6, 7
2SC2358-22-A		TR	1	1									Q 6
2SK192A(GR)*N		FET	2	2									Q 3, 4
3SK129(Q,R)	N	FET	1	1									Q 1
3SK122(L)		FET	2	2									Q 2, 5

# PARTS LIST TS-711A/E

## FINAL UNIT (X45-1380-11)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO	
			011											
CC45CH1H0R5C		CERAMIC 0.5P 50V	1										C	6
CC45CH1H010C		CERAMIC 1P 50V	2										C	2, 9
CC45CH1H180J		CERAMIC 18P 50V	1										C	15
CC45SL2H060D		CERAMIC 6P 500V	1										C	10
CC45SL2H100D		CERAMIC 10P 500V	2										C	31, 32
CC45SL2H220J		CERAMIC 22P 500V	5										C	3, 5, 7, 8, 33
CE04W1C220M		ELECTRO 22 16V	1										C	23
CE04W1C101M		ELECTRO 100 16V	1										C	25
CS15E1VR47M		TANTALUM 0.47 35V	1										C	26
C90-0871-05		ELECTRO 220 16V	2										C	29, 30
C90-0838-05		ELECTRO 1 50V	1										C	13
C90-0861-05		ELECTRO 22 16V	1										C	28
E04-0161-05	N	UHF RECEPTACLE	1											
E29-0440-14		GND WAFER	1											
E31-2061-05		JUMPER WIRE DO	1											
E31-3061-05		WIRE WITH CONNEFAN	1											
F09-0405-34		FAN	1											
F20-0078-05		INSULATING PLATE	1											
F29-0014-05		INSULATING WASHER	1											
G02-0549-04	N	SPRING FOR MOTOR	1											
L34-0452-05		VHF COIL 3 6T	2										L	4, 6
L34-0823-05		VHF COIL 5 3T	1										L	9
L34-0894-05		COIL 3 5T	1										L	2, 5
L34-0908-05		COIL 3 9.5T	2										L	1
L34-1019-05		COIL 3 2.5T	1										L	7
L40-1092-14		INDUCTOR 1 UH	1										L	8
L40-1092-16		INDUCTOR 1 UH	1										D	2
MI308		DIODE	1										D	1
MI407		DIODE	1										Q	1
M57727		POWER MODULE	1											
N14-0509-05		NUT	1										VR	2
R12-0541-05		TRIM.POT. 100 OHM	1										VR	1
R12-5517-05		TRIM.POT. 100 OHM	1										TH	1
SDT1000F		THERMISTER	1											
T42-0302-05		DC MOTOR	1										D	3
1S5101		DIODE	4										D	4, 5, 6, 7
1S1587		DIODE	1										Q	2
2SA1012(Y)		TR	1										Q	4
2SA1048(Y)		TR	1										Q	3
2SC1815(Y)		TR	1										Q	5
2SD717(O,Y)	N	TR	1											

## IF UNIT (X48-1400-XX) (-00 : T,W -11 : K,M1,M2,X)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO	
			000	001	011									
CC45CH1H150J		CERAMIC 15P 50V	5		5								C	52, 57, 90, 121, 190
CC45SL1H220J		CERAMIC 22P 50V	3		3								C	1, 118, 185
CC45CH1H100D		CERAMIC 10P 50V	1		1								C	119
CC45CH1H470J		CERAMIC 47P 50V	3		3								C	69, 106, 107
CC45CH1H0R5C		CERAMIC 0.5P 50V	2		2								C	7, 31
CC45CH1H180J		CERAMIC 18P 50V	1		1								C	18
CC45SL1H121J		CERAMIC 120P 50V	1		1								C	165
CC45CH1H220J		CERAMIC 22P 50V	1		1								C	114
CC45CH1H0R5C		CERAMIC 0.5P 50V	2		2								C	8, 115
CC45SL2H470J		CERAMIC 47P 500V	1		1								C	122
CC45CH1H330J		CERAMIC 33P 50V	1		1								C	37
CC45CH1H020C		CERAMIC 2P 50V	1		1								C	103
CC45CH1H330J		CERAMIC 33P 50V	2		1								C	3, 37
CC45CH1H330J		CERAMIC 33P 50V	1		1								C	3, 37
CC45CH1H030C		CERAMIC 3P 50V	1		1								C	92
CC45CH1H121J		CERAMIC 120P 50V	1		1								C	15
CC45CH1H050C		CERAMIC 5P 50V	2		2								C	32, 65
CC45SL1H470J		CERAMIC 47P 50V	4		4								C	64, 101, 108, 126
CC45SL2H221J		CERAMIC 220P 50V	1		1								C	14
CC45CH1H070D		CERAMIC 7P 50V	2		2								C	30, 91
CC45CH1H100D		CERAMIC 10P 50V	7		7								C	19, 24, 25, 48, 61, 74, 97
CC45UJ1H020C		CERAMIC 2P 50V	1		1								C	14
CC45UJ1H100D		CERAMIC 10P 50V	1		1								C	13
CE04W1H010M		ELECTRO 1 50V	9		1								C	38, 77, 80, 82, 83, 157, 163
CE04W1H010M		ELECTRO 1 50V	10		10								C	172, 174
CE04W1H2R2M		ELECTRO 2.2 50V	1		1								C	11, 38, 77, 80, 82, 83, 157
CE04W1E4R7M		ELECTRO 4.7 25V	6		6								C	163, 172, 174
CE04W1C100M		ELECTRO 10 16V	3		3								C	187
CE04W1C220M		ELECTRO 22 16V	1		1								C	81, 155, 162, 181, 182, 188
CE04W1A470M		ELECTRO 47 10V	3		3								C	99, 130, 173
CE04W1A221M		ELECTRO 220 10V	1		1								C	180
CK45B1H331K		CERAMIC 330P 50V	1		1								C	79, 171, 183
CK45B1H471K		CERAMIC 470P 50V	1		1								C	182
CK45B1H102K		CERAMIC 1000P 50V	8		8								C	131
CK45B1H331K		CERAMIC 330P 50V	2		2								C	179
CK45B1H471K		CERAMIC 470P 50V	1		1								C	4, 5, 9, 12, 42, 94, 135
CK45B1H102K		CERAMIC 1000P 50V	12		12								C	140
CK45B1H102K		CERAMIC 1000P 50V	11		11								C	70, 87
CK45F1H103Z		CERAMIC 0.01 50V	1		1								C	47, 110, 153, 177
CK45F1H103Z		CERAMIC 0.01 50V	6		6								C	47, 110, 145, 153, 177
CQ92M1H332K		MYLAR 3300P 50V	1		1								C	6, 23, 45, 98, 136, 145, 156
CQ92M1H103K		MYLAR 0.01 50V	1		1								C	159, 168, 186, 189, 193
CQ92M1H153K		MYLAR 0.015 50V	1		1								C	6, 23, 45, 98, 136, 156, 159
CQ92M1H223K		MYLAR 0.022 50V	1		1								C	168, 186, 189, 193
CQ92M1H473K		MYLAR 0.047 50V	2		2								C	88
CQ92M1H683K		MYLAR 0.068 50V	2		2								C	29, 43, 85, 89, 138, 144
CS15E1V0R1M		TANTALUM 0.1 35V	2		2								C	175
CS15E1V0R47M		TANTALUM 0.47 35V	1		1								C	176
CS15E1E010M		TANTALUM 1 25V	2		2								C	160
CS15E1C2R2M		TANTALUM 2.2 16V	1		1								C	169
CO5-0030-15		TRIMMER 20P	1		1								TC	78, 161

# TS-711A/E PARTS LIST

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY							REFERENCE NO
			000	001	011					
C05-0031-15		TRIMMER 10P	2		2					TC 1, 3
C91-0667-05		CERAMIC 0.0047 50V	1		1					C 167
C91-0117-05		CERAMIC 0.01 50V	6		6					C 2, 10, 17, 67, 112, 137
C91-1008-05		CERAMIC 0.022 50V	11		11					C 33, 49, 56, 62, 63, 102, 123
C91-0117-05		CERAMIC 0.01 50V	12		12					C 125, 146, 149, 150
C91-1008-05		CERAMIC 0.022 50V	32		32					C 26, 27, 35, 36, 46, 68, 86
C91-1008-05		CERAMIC 0.022 50V								C 111, 116, 117, 139, 154
C91-0119-05		CERAMIC 0.047 50V	3		3					C 20, 21, 22, 34, 50, 53, 54
C91-0457-05		CERAMIC 0.022 50V	2		2					C 55, 58, 60, 72, 73, 75, 76
C91-0457-05		CERAMIC 0.022 50V	4		4					C 84, 93, 95, 96, 100, 104
C91-0085-05	N	CERAMIC 0.022 50V	1		1					C 105, 127, 128, 129, 132, 134, 141
C91-0667-05		CERAMIC 0.0047 50V	2		2					C 143, 147, 148, 151, 158
C91-0119-05		CERAMIC 0.047 25V	1		1					C 109, 113, 142
										C 28, 66
										C 51, 59, 120, 124
										C 192
										C 164, 184
										C 40
DTC114ES		DIGITAL TR	1		1					Q 19
E04-0154-05		RF COAX. CONNECTOR RA, HET, DO			2					
E23-0512-05		TERMINAL 1P	4		4					
E40-0273-05	*	MINI CONNECTOR 2P	6		6					
E40-0473-05	*	MINI CONNECTOR 4P	1		1					
E40-0573-05	*	MINI CONNECTOR 5P	4		4					
E40-0673-05	*	MINI CONNECTOR 6P	1		1					
E40-0773-05	*	MINI CONNECTOR 7P	1		1					
E40-0973-05	*	MINI CONNECTOR 9P	2		2					
G02-0535-04			2		2					
L30-0281-15		IFT	4		4					L 13, 14, 15, 18
L30-0289-05		IFT	5		5					L 6, 7, 20, 21, 22
L30-0503-05		IFT	3		3					L 25, 27, 33
L30-0504-05		IFT	1		1					L 32
L33-0681-05	N	CHOKE COIL 6.8 UH	1		1					L 5
L34-2231-05	N	TUNING COIL 30MHZ	1		1					L 8
L34-2038-05		TUNING COIL	4		4					L 9, 10, 11, 24
L34-2041-05		TUNING COIL	3		3					L 1, 2, 3
L34-2045-05		TUNING COIL	3		3					L 23, 28, 29
L40-1501-03		INDUCTOR 15 UH	1		1					L 26
L40-1511-03		INDUCTOR 150 UH	2		2					L 17, 19
L40-1021-03		INDUCTOR 1 MH	3		3					L 16, 35, 36
L40-1011-16		INDUCTOR 100 UH	1		1					L 38
L40-1011-17		INDUCTOR 100 UH	1		1					L 30
L71-0249-05	N	XTAL FILTER 10F22S	1		1					L 12
L72-0342-05		CERAMIC FILTER CFV455F	1		1					L 31
L77-1254-05	N	XTAL 13.6570MHZ	1		1					L 4
L79-0446-05		CERAMIC DISCRI CFY455S	1		1					L 34
MC911		DIODE	2		2					D 27, 28
MC931		DIODE	5		5					D 9, 24, 29, 32, 38
ND487C1-3R		DIODE	1		1					D 16
R12-0421-05		TRIM.POT. 100 OHM	1		1					VR 8

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY							REFERENCE NO
			000	001	011					
R12-1429-05		TRIM.POT. 500 OHM	1		1					VR 6
R12-1430-05		TRIM.POT. 3K OHM	1		1					VR 2
R12-3443-05		TRIM.POT. 10K OHM	3		3					VR 1, 4, 7
R12-3450-05	N	TRIM.POT. 20K OHM	1		1					VR 9
R12-7408-05	N	TRIM.POT. 500KOHM	2		2					VR 3, 5
TA7302P		IC	2		2					Q 41, 44
JPC577H(E,F)		IC	1		1					Q 46
JPC4558C		IC	1		1					Q 47
1N60		DIODE	4		4					D 10, 11, 12, 13
1S5133		DIODE	6		6					D 1, 5, 18, 30, 33, 39
1S5133		DIODE	17		17					D 2, 4, 6, 7, 8, 15, 17
1S1587		DIODE	1		1					D 21, 22, 23, 25, 26, 31, 34
1S1587		DIODE	2		2					D 35, 36, 37
1S2208		VOLTAGE VARIABLE	1		1					D 14
112-102-2		THERMISTER	2		2					D 19, 20
112-103-2		THERMISTER	1		1					D 3
2SA1048(Y)		TR	9		9					D 1
2SA2458(Y)		TR								Q 11, 12, 13, 15, 16, 17, 18
2SC3113(B)		TR	2		2					Q 27, 60
2SC2668(Y,D)		TR	2		2					Q 55, 56, 58, 59, 61, 62
2SC2668(Y)		TR	5		5					Q 54, 57
2SC2240(GR)		TR			1					Q 1, 2
2SC2458(Y)		TR	26							Q 4, 36, 38, 40, 48
2SC2458(Y)		TR			23					Q 29
2SC2458(Y)		TR								Q 3, 9, 14, 23, 24, 28, 29
2SK125		FET	1		1					Q 30, 31, 33, 37, 39, 42, 43
2SK30A(O)		FET	3		3					Q 48, 49, 50, 51, 52, 52
2SK161(GR)		FET	2		2					Q 3, 9, 14, 23, 24, 28, 30
3SK73(GR)		FET	6		6					Q 31, 33, 37, 39, 42, 43, 48
3SK73(Y)		FET	1		1					Q 49, 50, 51, 52, 53, 55
										Q 56, 58, 59
										Q 35
										Q 10, 25, 26
										Q 6, 7
										Q 5, 8, 20, 21, 22, 32
										Q 34

# PARTS LIST TS-711A/E

## AF UNIT (X49-1180-00)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			000	001	011	012	013	014	015	016	017	018	
CC45SL1H390J		CERAMIC 39P 50V	1										C 32
CC45SL1H101J		CERAMIC 100P 50V	3										C 2, 3, 45
CE04W1E4R7M		ELECTRO 4.7 25V	7										C 20, 21
CE04W1C100M		ELECTRO 10 16V	1										C 6, 8, 9, 10, 17, 40, 52
CE04W1C220M		ELECTRO 22 16V	5										C 7
CE04W1A470M		ELECTRO 47 10V	1										C 5, 22, 25, 46, 56
CE04W1A101M		ELECTRO 100 10V	1										C 47
CE04BW1HR47M		ELECTRO 0.47 50V	1										C 27
CE04W1H010M		ELECTRO 1 50V	18										C 4, 11, 13, 14, 15, 16, 18
CE04BW1H010M		ELECTRO 1 50V	2										C 19, 26, 28, 29, 35, 37, 38
CK45B1H471K		CERAMIC 470P 50V	1										C 41, 42, 48, 53
CK45B1H561K		CERAMIC 560P 50V	1										C 23, 24
CK45B1H102K		CERAMIC 1000P 50V	5										C 43
CK45B1H152K		CERAMIC 1500P 50V	1										C 31
CQ92M1H332K		MYLAR 3300P 50V	1										C 36, 39, 44, 61, 63
CQ92M1H403K		MYLAR 0.01 50V	1										C 33
CQ92M1H123K		MYLAR 0.012 50V	4										C 12
CQ92M1H104K		MYLAR 0.1 50V	1										C 34
CS15E1V0R1M		TANTALUM 0.1 35V	1										C 54, 55, 57, 58
CS15E1C3R3M		TANTALUM 3.3 16V	1										C 50
C90-0882-05		ELECTRO 220 25V	1										C 59
C90-0820-05		ELECTRO 470 16V	1										C 60
E40-0373-05	*	MINI CONNECTOR 3P	1										C 51
E40-0473-05	*	MINI CONNECTOR 4P	1										C 49
E40-0573-05	*	MINI CONNECTOR 5P	2										
E40-0673-05	*	MINI CONNECTOR 6P	1										
E40-0773-05	*	MINI CONNECTOR 7P	1										
E40-0973-05	*	MINI CONNECTOR 9P	1										
MB3713		IC	1										Q 11
MC911		DIODE	2										D 2, 8
MC921		DIODE	1										D 11
NJM4558S		IC	2										Q 4, 9
N30-3004-46		PAN HD SCREW	1										
R12-3443-05		TRIM.POT. 10K OHM	2										VR 1, 3
R12-4413-05		TRIM.POT. 50K OHM	2										VR 4
R12-5420-05		TRIM.POT. 100K OHM	1										VR 2
UPC1158W2		IC	1										Q 5
1N60		DIODE	1										D 5
1SS133		DIODE	1										D 10
1SS133		DIODE	6										D 1, 3, 4, 6, 7, 9
2SA1048(Y)		TR	2										Q 2, 13
2SC2458(Y)		TR	8										Q 3, 7, 8, 10, 12, 14, 15
2SC2459(GR)		TR	1										Q 16
2SK30A(GR)		FET	1										Q 1
													Q 6

## PLL UNIT (X50-1990-XX) (-00 : T,W -11 : K,M1,M2,X)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			000	001	011	012	013	014	015	016	017	018	
CC45CH1H060D		CERAMIC 6P 50V	1	1									C 91
CC45CH1H010C		CERAMIC 1P 50V	1	1									C 125
CC45CH1H070D		CERAMIC 7P 50V	1	1									C 110
CC45SL1H470J		CERAMIC 47P 50V	5	5									C 14, 32, 89, 161, 170
CC45CH1H050C		CERAMIC 5P 50V	2	2									C 66, 152
CC45CH1H060D		CERAMIC 6P 50V	1	1									C 120
CC45CH1H100D		CERAMIC 10P 50V	2	2									C 137, 158
CC45CH1H180J		CERAMIC 18P 50V	4	4									C 30, 81, 119, 164
CC45CH1H080D		CERAMIC 8P 50V	2	2									C 96, 155
CC45SL1H101J		CERAMIC 100P 50V	2	2									C 146, 160
CC45CH1H150J		CERAMIC 15P 50V	2	2									C 95, 165
CC45SL1H221J		CERAMIC 220P 50V	1	1									C 104
CC45CH1H100D		CERAMIC 10P 50V	1	1									C 135
CC45UJ1H270J		CERAMIC 27P 50V	1	1									C 118
CC45SL1H331J		CERAMIC 330P 50V	1	1									C 46
CC45CH1H150J		CERAMIC 15P 50V	1	1									C 65
CC45CH1H180J		CERAMIC 18P 50V	2	2									C 52, 54
CC45CH1H0R5C		CERAMIC 0.5P 50V	3	3									C 144, 162, 169
CC45CH1H220J		CERAMIC 22P 50V	2	2									C 136, 148
CC45CH1H220J		CERAMIC 22P 50V	4	4									C 1, 9, 20, 22
CC45CH1H030C		CERAMIC 3P 50V	4	4									C 21, 44, 124, 151
CC45CH1H270J		CERAMIC 27P 50V	1	1									C 43
CC45CH1H040C		CERAMIC 4P 50V	1	1									C 64
CC45CH1H270J		CERAMIC 27P 50V	3	3									C 10, 50, 121
CC45CH1H330J		CERAMIC 33P 50V	2	2									C 128, 129
CC45CH1H330J		CERAMIC 33P 50V	3	3									C 3, 40, 85
CC45CH1H050C		CERAMIC 5P 50V	1	1									C 147
CC45CH1H680J		CERAMIC 68P 50V	1	1									C 45
CC45SL1H390J		CERAMIC 39P 50V	4	4									C 82, 84, 86, 88
CC45CH1H050C		CERAMIC 5P 50V	1	1									C 147
CC45SL1H470J		CERAMIC 47P 50V	4	4									C 4, 84, 87, 127
CC73ECH1H010C		CHIP CAP. 1P 50V	1	1									C 61
CC73ECH1H080D		CHIP CAP. 8P 50V	1	1									C 63
CC73ECH1H070D		CHIP CAP. 7P 50V	1	1									C 62
CC73ECH1H100D		CHIP CAP. 10P 50V	1	1									C 62
CC73ECH1H160J		CHIP CAP. 16P 50V	1	1									C 40
CE04W1E4R7M		ELECTRO 4.7 25V	1	1									C 58
CE04W1A470M		ELECTRO 47 10V	5	5									C 77, 107, 113, 116, 150
CE04W1A101M		ELECTRO 100 10V	3	3									C 69, 99, 122
CK45B1H102K		CERAMIC 1000P 50V	10	10									C 8, 11, 13, 57, 94, 97, 102
CK45F1H103J		CERAMIC 0.01 50V	4	4									C 117, 145, 166
CK45B1H681K		CERAMIC 680P 50V	2	2									C 47, 138, 143, 156
CK45B1H102K		CERAMIC 1000P 50V	12	12									C 101, 103
CQ92M1H222K		MYLAR 2200P 50V	1	1									C 2, 6, 7, 12, 59, 68, 70
CQ92M1H822K		MYLAR 8200P 50V	1	1									C 71, 92, 131, 167, 177
CQ92M1H223K		MYLAR 0.022 50V	1	1									C 74
CQ92M1H473K		MYLAR 0.047 50V	1	1									C 114
CQ92M1H683K		MYLAR 0.068 50V	1	1									C 75
CS15E1V822M		TANTALUM 0.22 35V	1	1									C 56
CS15E1V47M		TANTALUM 0.47 35V	1	1									C 111
CS15E1E010M		TANTALUM 1 25V	2	2									C 49
C05-0062-05		TRIMMER 6P	1	1									C 78
C05-0030-15		TRIMMER 20P	1	1									C 72, 73
C05-0067-05		TRIMMER 25P	2	2									TC 2
C91-0117-05		CERAMIC 0.01 50V	15	15									TC 1
													TC 3, 4
													C 5, 19, 23, 24, 29, 33, 3

# TS-711A/E PARTS LIST

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY								REFERENCE NO
			000	001	011	012					
C91-0117-05		CERAMIC 0.01 50V	7		7						C 39, 51, 76, 79, 90, 96, 123, 154
C91-1008-05		CERAMIC 0.022 50V	21		21						C 41, 48, 53, 108, 115, 126, 149
C91-1008-05		CERAMIC 0.022 50V									C 15, 17, 25, 26, 27, 28, 35
C91-1008-05		CERAMIC 0.022 50V	15		15						C 36, 37, 38, 55, 80, 105, 106, 112, 132, 133, 134, 140, 53
E04-0154-05		RF CDAX. CONNECTOR RA, HET, DO			1						C 176
E23-0512-05		TERMINAL 1P	9		9						C 16, 18, 31, 42, 98, 100, 109
E40-0473-05	*	MINI CONNECTOR 4P	1		1						C 130, 139, 141, 142, 157, 159, 163
E40-0673-05	*	MINI CONNECTOR 6P	1		1						C 168
E40-0873-05	*	MINI CONNECTOR 8P	1		1						
F11-0818-14		SHIELD CASE(VCO TOP CASE)	1		1						
L30-0289-05		IFT	1		1						L 44
L30-0281-15		IFT	2		2						L 9, 13
L32-0624-05		OSCILLATING COIL	1		1						L 21
L32-0639-05		OSCILLATING COIL 50MHZ	1		1						L 33
L33-0647-05		CHOKE COIL 18 UH	1		1						L 14
L33-0668-05		INDUCTOR 3.3 UH	1		1						L 20
L34-0894-05		COIL 3 5T	2		2						L 25, 26
L34-0908-05		COIL 3 9.5T	3		3						L 24, 27, 35
L34-1033-05		COIL 3 8.5T	3		3						L 1, 2, 3
L34-0683-05		TUNING COIL	1		1						L 4
L34-0749-05		TUNING COIL	2		2						L 45, 46
L34-2041-05		TUNING COIL	2		2						L 47, 48
L34-2232-05	N	TUNING COIL 51.2MHZ	2		2						L 39, 40
L34-3064-05		TUNING COIL	2		2						L 5, 7
L34-3066-05		TUNING COIL	1		1						L 6
L40-6891-03		INDUCTOR 68 UH	3		3						L 37, 38, 43
L40-1011-17		INDUCTOR 100 UH	2		2						L 32, 34
L40-1511-03		INDUCTOR 150 UH	2		2						L 12, 15
L40-3311-03		INDUCTOR 330 UH	2		2						L 30, 31
L40-1021-03		INDUCTOR 1 MH	3		3						L 11, 16, 18
L40-1092-16		INDUCTOR 1 UH	1		1						L 22
L40-1011-14		INDUCTOR 100 UH	2		2						L 23, 36
L40-4711-13		INDUCTOR 470 UH	1		1						L 42
L72-0346-05	N	CERAMIC FILTER SFE11.025MJ-A	2		2						L 8, 10
L77-0950-05		XTAL 10.6965MHZ	1		1						L 17
L77-0951-05		XTAL 10.6935MHZ	1		1						L 19
L77-1255-05	N	TCKO 10.240MHZ	1		1						L 41
L79-0644-05	N	BPF BPJ83	2		2						L 28, 29
MA856		DIODE	2		2						D 4, 5
MC145155P*K		IC	1		1						D 21
MC145156P		IC	1		1						D 19
MC921		DOUBLE DIODE	2		2						D 6, 8
MC921		DIODE	1		1						D 7
M54459L		IC	1		1						D 23
NJM78L05A		IC	1		1						D 37

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY								REFERENCE NO
			000	001	011	012					
R12-1405-05		TRIM.POT. 1K OHM	3		3						VR 1, 2, 3
SN14913P		IC	4		4						Q 3, 4, 6, 31
SN74S90N		IC	2		2						Q 22, 36
TA7302P		IC	1		1						Q 30
UPB555C		IC	1		1						Q 20
1SV50		DIODE	3		3						D 1, 2, 3
2SA1048(Y)		TR	1		1						Q 15
2SC2459(BL)		TR	3		3						Q 12, 14, 25
2SC2459(BL)		TR	3		3						Q 13, 26, 27
2SC2458(Y)		TR	4		4						Q 9, 34, 35, 39
2SC2458(Y)		TR	3		3						Q 16, 33, 38
2SC2787(L)		TR	3		3						Q 7, 8, 41
2SC2668(Y,O)		TR	1		1						Q 24
2SC2668(Y,O)		TR	1		1						Q 32
2SC2668(Y)		TR	6		6						Q 5, 11, 17, 18, 29, 40
2SC2668(Y)		TR	1		1						Q 1
2SK192A(GR)=N		FET	2		2						Q 10, 28
3SK73(Y)		FET	1		1						Q 2



# PARTS LIST TS-711A/E

## STONE UNIT (X52-1290-60) (T,W)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			060										
CK4581H102K		CERAMIC 1000P 50V	1										C
CQ92M1H472K		MYLAR 4700P 50V	1										C
CQ92M1H103K		MYLAR 0.01 50V	1										C
CQ92M1H333K		MYLAR 0.033 50V	1										C
C90-0847-05		ELECTRO 47 10V	1										C
C91-0433-05		CAPACITOR 0.01 50V	1										C
C91-0117-05		CERAMIC 0.01 50V	1										C
E40-0417-05			1										
NE555P		IC	1										IC 1
RD14882C472J		RES. CARBON 4.7KOHM 1/6W	1										R
RD14882C123J		RES. CARBON 12K OHM 1/6W	1										R
RD14882C333J		RES. CARBON 33K OHM 1/6W	1										R
RD14882C473J		RES. CARBON 47K OHM 1/6W	1										R
RN148K289102F		METAL FILM 91K 1/8W	1										R
R12-3521-05		TRIM.POT. 20K	1										VR 1

## CONTROL UNIT (X53-1410-XX) (-11 : K,M1 -21 : M2,X -51 : T -61 : W)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			011	012	021	022	051	052	061	062			
CC4581H150J		CERAMIC 15P 50V	2			2			2				C 52, 53
CC4581H270J		CERAMIC 27P 50V	1		1				1				C 73
CC4581H270J		CERAMIC 27P 50V	1		1				1				C 72
CC4581H330J		CERAMIC 33P 50V	1		1				1				C 54
CC4581H121J		CERAMIC 120P 50V	1		1				1				C 44
CE04W1C221M		ELECTRO 220 16V	2		2				2				C 65, 69
CE04W1A471M		ELECTRO 470 10V	1		1				1				C 66
CE04W1HR47M		ELECTRO 0.47 50V	1		1				1				C 19
CF92V1H104J		POLYESTER 0.1 50V	2		2				2				C 47, 79
CK4581H182K		CERAMIC 1800P 50V	1		1				1				C 37
CQ92M1H182K		MYLAR 1800P 50V	1		1				1				C 21
CQ92M1H102K		MYLAR 1000P 50V	1		1				1				C 43
CQ92M1H482K		MYLAR 6800P 50V	1		1				1				C 46
CS15E1A100M		TANTALUM 10 10V	1		1				1				C 22
C90-083A-05		ELECTRO 1 50V	1		1				1				C 48, 50
C90-0844-05		ELECTRO 33 10V	2		2				2				C 42
C90-0847-05		ELECTRO 47 10V	1		1				1				C 41
C90-0837-05		ELECTRO 0.1 50V	1		1				1				C 7, 8, 16, 30, 31, 70, 71
C91-0457-05		CERAMIC 0.022 50V	8		8				8				C 84
C91-0457-05		CERAMIC 0.022 50V	2		2				2				C 26, 64
C91-0753-05		CERAMIC 470P 50V	4		4				4				C 1, 9, 10, 36
C91-0117-05		CERAMIC 0.01 50V	1		1				1				C 86
C91-0757-05		CERAMIC 0.001 50V	21		21				21				C 2, 3, 4, 5, 6, 11, 12
C91-0757-05		CERAMIC 0.001 50V	21		21				21				C 13, 14, 29, 32, 35, 38, 39
C91-0757-05		CERAMIC 0.001 50V	1		1				1				C 40, 68, 79, 80, 81, 82
C91-0757-05		CERAMIC 0.001 50V	1		1				1				C 83
C91-0753-05		CERAMIC 470P 50V	4		4				4				C 56
C91-0757-05		CERAMIC 0.001 50V	4		4				4				C 27, 28, 77, 78
C91-0769-05		CERAMIC 0.01 50V	5		5				5				C 17, 25, 63, 74, 75
DAP401	N	DIODE	3		3				3				D 1, 3, 4, 5, 6, 7
DTA114YS		DIGITAL TR	3		3				3				Q 1, 3, 5
DTA114YS	N	DIGITAL TR	3		3				3				Q 2, 4, 6
DTC143TS		DIGITAL TR	2		2				2				Q 11, 12
E02-0122-05	N	IC SOCKET 24PIN	1		1				1				
E23-0512-05		TERMINAL 1P	2		2				2				
J32-0761-04		STUD & BOSS (STICK TYPE)	1		1				1				
L77-1206-05	N	XTAL 3.6864MHZ	1		1				1				X 2
L78-0009-05	N	CERAMIC OSC 4MHZ	1		1				1				X 1
MB8418-20LP-GR	N	IC 8BIT X2(RAM)	1		1				1				IC 14
MC1584BCP		IC	1		1				1				IC 11
MC1069UBCP		IC	2		2				2				IC 1, 2
MN6127A		IC	1		1				1				IC 19
MT212JB		ZENER DIODE 12V	1		1				1				D 17
MT29.1JB		ZENER DIODE 9.1V	1		1				1				D 11
M51825AP-5	N	IC	1		1				1				IC 16
N30-3006-46		PAN HD SCREW	2		2				2				
N30-3010-46		PAN HD SCREW	1		1				1				
N87-2606-46		TAPPING SCREW	2		2				2				
PST518A	N	IC	1		1				1				IC 10

# TS-711A/E PARTS LIST

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY								REFERENCE NO
			011	012	021	022	051	052	061	062	
R12-4416-05	N	TRIM.POT 50K	1	1	1	1	1	1	1	1	VR 1
R90-0515-05		RESISTOR BLOCK 10K	2	2	2	2	2	2	2	2	R 1, 15
R90-0521-05		RESISTOR BLOCK 47K X7	1	1	1	1	1	1	1	1	R 3, 9
R90-0532-05		RESISTOR BLOCK 27K X5	1	1	1	1	1	1	1	1	R 83
R90-0534-05		RESISTOR BLOCK 10K X5	1	1	1	1	1	1	1	1	R 38
R90-0578-05	N	RESISTOR BLOCK 5.1K X10	1	1	1	1	1	1	1	1	R 70
SN74LS05N		IC	1	1	1	1	1	1	1	1	IC 23
SN74LS32N		IC	1	1	1	1	1	1	1	1	IC 23
SN74LS138N		IC	1	1	1	1	1	1	1	1	IC 15
SN74LS174N		IC	3	3	3	3	3	3	3	3	IC 12, 17, 22
TC4011BP		OR BU4011BP	7	7	7	7	7	7	7	7	IC 3, 4, 5, 6, 7, 8, 9
TC4069JBP		IC	1	1	1	1	1	1	1	1	IC 1, 2
TMP8255AP-5	N	IC	1	1	1	1	1	1	1	1	IC 16
UPC4558C		IC	1	1	1	1	1	1	1	1	IC 18
UPC7805H		IC	1	1	1	1	1	1	1	1	IC 21
JP078026-087-36	N	MICRO-PROCESSOR	1	1	1	1	1	1	1	1	IC 24
JP08255AC-5	N	IC	1	1	1	1	1	1	1	1	IC 16
JP07507G-575-00		MICRO-PROCESSOR FOR DCS	1	1	1	1	1	1	1	1	IC 20
1SS133		DIODE	19	19	19	19	19	19	19	19	D 2, 8, 9, 10, 13, 14, 15
1SS133		DIODE	4	4	4	4	4	4	4	4	D 18, 19, 20, 21, 22, 23, 24
1SS133		DIODE	3	3	3	3	3	3	3	3	D 25, 26, 27, 28, 29
1SS133		DIODE	5	5	5	5	5	5	5	5	D 30, 31, 33, 35
1SS133		DIODE	6	6	6	6	6	6	6	6	D 30, 33, 35
2SA1307(Y)	N	TR	1	1	1	1	1	1	1	1	Q 14
2SA1015(Y)		TR	2	2	2	2	2	2	2	2	Q 18, 20
2SA1048(Y)		TR	1	1	1	1	1	1	1	1	Q 21
2SA1115(E)		TR	3	3	3	3	3	3	3	3	Q 21
2SA1015(Y)		TR	1	1	1	1	1	1	1	1	Q 16, 17, 19
2SC1959(Y)		TR	4	4	4	4	4	4	4	4	Q 13
2SC2458(Y)		TR	4	4	4	4	4	4	4	4	Q 7, 8, 9, 10
2SC2703(D,Y)		TR	1	1	1	1	1	1	1	1	Q 15

## DISPLAY UNIT (X54-1820-11)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY								REFERENCE NO
			011	012	021	022	051	052	061	062	
TC4551H101J		CERAMIC 100P 50V	1	1	1	1	1	1	1	1	C 20
CE04W1V100M		ELECTRO 10 35V	2	2	2	2	2	2	2	2	C 12, 13
CE04W1C100M		ELECTRO 10 16V	2	2	2	2	2	2	2	2	C 10, 14
CE04W1C330M		ELECTRO 33 16V	1	1	1	1	1	1	1	1	C 8
CE04W1A470M		ELECTRO 47 10V	1	1	1	1	1	1	1	1	C 5
CK45B1H102K		CERAMIC 1000P 50V	8	8	8	8	8	8	8	8	C 1, 2, 3, 15, 16, 17, 18
CQ92M1H103K		MYLAR 0.01 50V	1	1	1	1	1	1	1	1	C 19
CQ92M1H223K		MYLAR 0.022 50V	1	1	1	1	1	1	1	1	C 21
C91-0749-05		CERAMIC 0.01 50V	1	1	1	1	1	1	1	1	C 4
C91-1008-05		CERAMIC 0.022 50V	2	2	2	2	2	2	2	2	C 7, 9
DTA124EF	N	DIGITAL TR	2	2	2	2	2	2	2	2	Q 11, 12
E06-0858-05		8P METAL SOCKET	1	1	1	1	1	1	1	1	
E11-0401-05		EARPHONE JACK EXT.SP	1	1	1	1	1	1	1	1	
E11-0407-05		EARPHONE JACK	1	1	1	1	1	1	1	1	
E11-0413-05		PHONE JACK PHONES	1	1	1	1	1	1	1	1	
E11-0422-05	N	KEY JACK KEY	1	1	1	1	1	1	1	1	
E31-3052-15	N	TAPE CABLE 10X25MM	1	1	1	1	1	1	1	1	
E31-3053-15	N	TAPE CABLE 12X25MM	1	1	1	1	1	1	1	1	
E31-3054-05	N	TAPE CABLE 4X50MM	1	1	1	1	1	1	1	1	
E31-3055-05	N	TAPE CABLE 11X50MM	1	1	1	1	1	1	1	1	
E31-3056-05	N	TAPE CABLE 12X50MM	1	1	1	1	1	1	1	1	
FIP11FM7		DISPLY TUBE	1	1	1	1	1	1	1	1	V 1
L19-0323-05		TRANSFORMER	1	1	1	1	1	1	1	1	T 1
L30-0504-05		IFT	1	1	1	1	1	1	1	1	L 2
L40-1511-14		INDUCTOR 150 UH	1	1	1	1	1	1	1	1	L 3
L40-1011-04		INDUCTOR 100 UH	1	1	1	1	1	1	1	1	L 1
MC931		DIODE	2	2	2	2	2	2	2	2	D 3, 4
MT26.2JA		DIODE	1	1	1	1	1	1	1	1	D 2
MT27.5JA		DIODE	1	1	1	1	1	1	1	1	D 5
R12-2413-05		TRIM.POT.(5K)	1	1	1	1	1	1	1	1	VR 6
R12-3446-05		TRIM.POT.(30K)	1	1	1	1	1	1	1	1	VR 3
R12-5420-05		TRIM.POT. 100KOHM	1	1	1	1	1	1	1	1	VR 7
R12-7403-05		TRIM.POT. 500KOHM	1	1	1	1	1	1	1	1	VR 8
R19-3420-05		POTENTIOMETER	1	1	1	1	1	1	1	1	VR 4
R19-9409-05	N	POTENTIOMETER	1	1	1	1	1	1	1	1	VR 2
R24-9404-05	N	POTENTIOMETER	1	1	1	1	1	1	1	1	VR 5
R90-0520-05		RESISTOR BLOCK 47K OHM X5	1	1	1	1	1	1	1	1	R 25
R90-0522-05		RESISTOR BLOCK 47K OHM X6	1	1	1	1	1	1	1	1	R 24
R90-0579-05	N	RESISTOR BLOCK 47K OHM X11	1	1	1	1	1	1	1	1	R 23
TC5066BP		IC	2	2	2	2	2	2	2	2	Q 7, 8
JP480C		IC	1	1	1	1	1	1	1	1	Q 6
JPD763C	N	IC	1	1	1	1	1	1	1	1	Q 5
1N60		DIODE	1	1	1	1	1	1	1	1	D 1
112-351-2		THERMISTOR	1	1	1	1	1	1	1	1	TH 1
2SC1959(Y)		TR	2	2	2	2	2	2	2	2	Q 9, 10
2SC2458(Y)		TR	1	1	1	1	1	1	1	1	Q 4

# PARTS LIST TS-811A/B/E

## SEMICONDUCTOR (TS-811A/B/E)

N : New parts

\* : Please note that parts are sometimes not in stock and it takes much time to deliver.

Item	Re- marks	Part No.	Item	Re- marks	Part No.	Item	Re- marks	Part No.
Diode	N	1N60	Resistor block		S10VB20	Power module		M57745
		1S1587	Photo TR		PN126S(R)			BU4011B
		1SS97	Digital TR		DTA114Y(S)			LM358P
		1SS101			DTA124EF		N	M54459L
		1SS133			DTC114E(S)		N	M5L8255AP-5
		1SV50			DTC143T(S)			MB3713
		DAP401						MB8418-20LP-GRA
		MA856						MC14069UBCP
		MC911	TR	N	2SA933S(Q)			MC14584BCP
		MC921			2SA1012(Y)			MC145155P*K
		MC931			2SA1015(Y)			MC145156P
		MI308			2SA1048(Y)			MN6127A
		MI407			2SA1115(E)			NE555P
		ND487C1-3R			2SA1307(Y)		N	NJM78L05A
		U05B			2SC1740S(Q)			NJM4558S
		V06B			2SC1815(Y)			PST518A
Vari-cap		1S2208			2SC1959(Y)			SN74LS05N
Varistor		MV13			2SC2026			SN74LS32N
		VD1223			2SC2240(GR)			SN74LS90N
Zener diode		MTZ6.2JA			2SC2458(Y)			SN74LS138N
		MTZ6.2J(A,B)			2SC2459(BL)			SN74LS174N
		MTZ7.5JA			2SC2459(GR)			SN16913P
		MTZ8.2J(B,C)			2SC2570A			TA7302P
		MTZ9.1JB			2SC2668(Y)			TC4011BP
		MTZ12JB			2SC2668(Y,O)		N	TC4069UBP
Disply tube		FIP11FM7			2SC2703(O,Y)			TC5066BP
LED		LN66(R)			2SC2762			TMP8255AP-5
		LN01201C			2SC2787(L)			μPA80C
		LN01301C			2SC3113(B)			μPB555C
		LN01401C			2SD717(O,Y)			μPC78M08H
Thermister		112-102-2	FET		2SK30A(GR)			μPC577H(E,F)
		112-103-2			2SK30A(O)			μPC1158H2
		112-351-2			2SK125		N	μPC4558C
		SDT1000F			2SK161(GR)			μPC7805H
					2SK192A(GR)*N		N	μPD763C
					3SK73(GR)			μPD7507G-575-00
					3SK73(Y)		N	μPD7802G-088-36
					3SK129(S,T)		N	μPD8255AC-5

## ENCODER ASS'Y (W02-0364-00)

PART. NO	Re- marks	NAME & DESCRIPTION	Q'TY	REFERENCE. NO
CE04CW0J330M		ELECTRO 33 6.3V	1	C1
LM358P		IC	1	IC1
LN66(R)		LED	3	D1, 2, 3
RD14BB2C102J		RES. CARBON 1kΩ	2	R5, 10
RD14BB2C105J		RES. CARBON 1MΩ	2	R8, 13
RD14BB2C181J		RES. CARBON 180Ω	3	R1, 2, 3
RD14BB2C182J		RES. CARBON 1.8kΩ	4	R6, 7, 11, 12
RD14BB2C222J		RES. CARBON 2.2kΩ	1	R15
RD14BB2C472J		RES. CARBON 4.7kΩ	4	R4, 9, 14, 16
R12-2413-05		TRIM. POT. 5kΩ	2	VR1, 2
R92-0150-05		SHORT JUMPER	2	
PN126S		PHOTO TR	3	Q1, 2, 3
V06B		DIODE	1	D1
2SC2458(Y)		TR	1	Q4

# TS-811A/B/E PARTS LIST

## TS-811A/B/E GENERAL

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY					REFERENCE NO
			011	021	031	061	071	
A01-0979-02	N	CASE(A) UPPER	1	1	1	1	1	
A01-0980-02	N	CASE(B) LOWER	1	1	1	1	1	
A20-2529-03	N	PANEL	1	1	1	1	1	
B05-0708-04	*	SP GRILE	1	1	1	1	1	
B10-0668-04		FRONT GLASS	1	1	1	1	1	
B30-0817-15		LAMP 14V 80MA	1	1	1	1	1	
B31-0655-05		METER	1	1	1	1	1	
B39-0407-04		SPACER	2	2	2	2	2	
B40-3565-04		MODEL NAME PLATE TS-811A	1					
B40-3549-14	N	MODEL NAME PLATE TS-811B		1				
B40-3550-14		MODEL NAME PLATE TS-811E			1	1		
B40-3549-14	N	MODEL NAME PLATE TS-811B					1	
B41-0140-04		CAUTION LABEL FUSE 3A	1					
B42-1739-04		VOLTAGE INDICATING PLATE 120V	1					
B42-1740-04		VOLTAGE INDICATING PLATE 220V		1				
B42-1741-04		VOLTAGE INDICATING PLATE 240V			1			
B42-1740-04		VOLTAGE INDICATING PLATE 220V				1		
B42-1741-04		VOLTAGE INDICATING PLATE 240V					1	
B42-2400-04	N	CURRENT INDICATING PLATE 8.5A	1					
B42-2375-14	N	CURRENT INDICATING PLATE 8.0A		1	1	1	1	
B42-2356-04		SWITCH LABEL DCS	1	1	1	1	1	
B43-1044-04	N	BADGE TS-811A	1					
B43-1039-04	N	BADGE TS-811B		1				
B43-1041-04	N	BADGE TS-811E TRIO			1			
B43-1040-04	N	BADGE TS-811E				1		
B43-1039-04	N	BADGE TS-811B					1	
B46-0410-00		WARRANTY CARD	1					
B50-4195-00	N	INSTRUCTION MANUAL (K)	1					
B50-4161-00	N	INSTRUCTION MANUAL (M,W,X)		1				
B50-4162-00	N	INSTRUCTION MANUAL (T)			1			
B50-4161-00	N	INSTRUCTION MANUAL (M,W,X)				1	1	
C91-0496-05		CERAMIC FOR AC 470P	2	2	2	2	2	
C91-0647-05		CERAMIC FOR AC 0.01	1	1	1	1	1	
D09-0306-04		ENCODER DISC ROTOR	1	1	1	1	1	
D09-0307-04		ENCODER DISC STATOR	1	1	1	1	1	
D40-0627-05		DETECTOR MECHANISM UNIT	1	1	1	1	1	
E07-1351-05	N	13P PLUG (ACC)	1	1	1	1	1	
E07-0852-05		VOLTAGE SELECTOR PLUG		1	1	1	1	
E08-0474-05		4P SOCKET DC	1	1	1	1	1	
E09-0472-05		4P PLUG DC	1	1	1	1	1	
E12-0001-15		PHONE PLUG (ACS)	1	1	1	1	1	
E12-0401-15		PHONE PLUG (ACS)	1	1	1	1	1	
E18-0351-05		3P AC SOCKET	1	1	1	1	1	
E29-0463-05		1P JUNCTION CONNECTOR	1	1	1	1	1	
E30-1643-15		AC CABLE (ACS)	1	1				
E30-1644-15		AC CABLE (ACS)			1			
E30-1645-05		AC CABLE (ACS)				1		
E30-1647-05		AC CABLE (ACS)					1	
E31-3049-05		CABLE WITH TERMINAL	1	1	1	1	1	
E31-3092-05	N*	CABLE WITH TERMHET	1	1	1	1	1	
E31-3051-05			1	1	1	1	1	
E31-3064-00	*	WIRE'S KIT (ACS)	1	1	1	1	1	
E40-0774-05	*	PIN ASS'Y	1	1	1	1	1	

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY					REFERENCE NO
			011	021	031	061	071	
F05-3022-05		FUSE 3A	1					
F05-2023-05		FUSE 2A		1	1	1	1	
F05-3022-05		FUSE 3A		1				
F07-0858-03		HEAT SINK COVER	1	1	1	1	1	
F10-1206-04	*	SHIELDING PLATE	5					
F10-1206-04		SHIELDING PLATE		6	6	6	6	
F11-0870-12	*	CONTROL CASE	1	1	1	1	1	
F15-0655-04	*	BLINDING PLATE	1	1	1	1	1	
F20-0521-04		INSULATING PLATE	1	1	1	1	1	
F29-0041-05	*	CAPACITOR COVER	1	1	1	1	1	
G01-0818-04		COILED SPRING	5	5			5	
G01-0818-04		COILED SPRING			4	4		
G02-0505-05		KNOB FITTING SPRING	3	3	3	3	3	
G02-0550-04		GND SPRING	1					
G13-0649-04	*	CUSHION FOR METER	2	2	2	2	2	
G13-0642-04	*	CUSHION FOR PLL	1	1	1	1	1	
G53-0510-04	*	PACKING FOR PANEL	1	1	1	1	1	
H01-4636-04	N	CARTON(INSIDE) TS-811A	1					
H01-4594-04	N	CARTON(INSIDE) TS-811B		1				
H01-4595-04	N	CARTON(INSIDE) TS-811E TRIO			1			
H01-4624-04	N	CARTON(INSIDE) TS-811E				1		
H01-4594-04	N	CARTON(INSIDE) TS-811B					1	
H03-2241-04	N	CARTON(OUTSIDE) TS-811A	1					
H03-2217-04	N	CARTON(OUTSIDE) TS-811B		1				
H03-2234-04	N	CARTON(OUTSIDE) TS-811E			1	1		
H03-2217-04	N	CARTON(OUTSIDE) TS-811B					1	
H10-2596-02	*	PACKING FIXTURE	1	1	1	1	1	
H10-2597-02	*	PACKING FIXTURE	1	1	1	1	1	
H12-1315-04		BUFFER	1	1	1	1	1	
H20-1425-03		PROTECTION COVER	1	1	1	1	1	
H25-0029-04		BAG(ACS) 60X110	1	1	1	1	1	
H25-0105-04		BAG 150X350	1	1	1	1	1	
H25-0103-04		BAG 125X250		1	1	1	1	
J02-0323-05		FOOT CASE(B)	4	4	4	4	4	
J02-0407-04		FOOT CASE(B)	1	1	1	1	1	
J02-0403-04		FOOT CASE(SIDE)	4	4	4	4	4	
J21-2573-04	*	FOOT HARDWARE	2	2	2	2	2	
J29-0407-04		SW GUIDE A (TACT KNOB)	5	5			5	
J29-0407-04		SW GUIDE A (TACT KNOB)			4	4		
J31-0141-04		COLLAR MIC	1	1	1	1	1	
J42-0442-05		HOLE BUSH ACC1	1	1	1	1	1	
J61-0404-05		FASTNER FOR DC PLUG	1	1	1	1	1	
J61-0408-05		VINYL TIE	1	1	1	1	1	
J61-0408-05		VINYL TIE	6	6	6	6	6	
K01-0410-05		HANDLE CASE(B)	1	1	1	1	1	
K21-0768-04		MAIN KNOB	1	1	1	1	1	
K23-0776-04		ROUND KNOB RIT	1	1	1	1	1	
K23-0710-04		KNOB	3	3	3	3	3	
K27-0467-04		KNOB UP/DOWN	2	2	2	2	2	
K29-0758-04		KNOB POWER	1	1	1	1	1	
K29-3001-04		KNOB NB	5	5	5	5	5	
K29-3032-04		TACT KNOB RIT.TONE	5	5			5	

## PARTS LIST TS-811A/B/E

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY					REFERENCE.NO			
			011	021	051	061	071				
K29-3032-04		TACT KNOB RIT.TONE				4	4				
K29-0771-04		MAIN TUNG KNOB	1	1	1	1	1				
K29-0741-04		KNOB	3	3	3	3	3				
L01-8266-05	N	POWER TRANSFORMER	1	1	1	1	1				
N09-0646-04		SCREW M4X4	2	2	2	2	2				
N16-0040-46		SPRING WASHER	1	1	1	1	1				
N30-2604-46		PAN HD SCREW	2	2	2	2	2				
N30-3004-46		PAN HD SCREW	2	2	2	2	2				
N30-3010-46		PAN HD SCREW			1	1					
N30-3006-46		PAN HD SCREW	2	2	2	2	2				
N32-2604-46		FLAT HD SCREW	6	6	6	6	6				
N32-2606-46		FLAT HD SCREW	6	6	6	6	6				
N32-3004-46		FLAT HD SCREW	2	2	2	2	2				
N32-3006-46		FLAT HD SCREW	2	2	2	2	2				
N33-3006-41		ROUND FLAT SCREW	4	4	4	4	4				
N33-3006-45		ROUND FLAT SCREW	4	4	4	4	4				
N35-2604-46		BIND SCREW	11	11	11	11	11				
N35-3004-41		BIND SCREW	18	18	18	18	18				
N35-3008-46		BIND SCREW	2	2	2	2	2				
N87-2405-46		TAPPING SCREW	47								
N87-2405-46		TAPPING SCREW		46	46	46	46				
N87-3006-46		TAPPING SCREW	10	10	10	10	10				
N87-4006-46		TAPPING SCREW	3	3	3	3	3				
N87-3010-41		TAPPING SCREW	6	6	6	6	6				
N87-3006-41		TAPPING SCREW	4	4	4	4	4				
N87-4008-46		TAPPING SCREW	1	1	1	1	1				
N88-2606-46		FLAT TAPPING SCREW	2	2	2	2	2				
N88-3006-46		FLAT TAPPING SCREW	2	2	2	2	2				
N89-3006-45		BIND TAPPING SCREW	4	4	4	4	4				
SD1000F		THERMISTER	1	1	1	1	1				
S29-2409-05		VOLTAGE SELECTOR SWITCH	1	1	1	1	1				
S31-1415-05		SLIDE SWITCH	1	1	1	1	1				
S40-2450-05		PUSH SWITCH	1	1	1	1	1				
S50-1406-05		TACT SWTCH(UP,DOWN)		2	2	2	2				
S59-0428-05		KEYBOARD ASS'Y DCS	1	1	1	1	1				
T03-0027-15		SPEAKER	1	1	1	1	1				
T91-0331-05		MICROPHONE (M,W)		1							
T91-0335-05		MICROPHONE (T)			1						
T91-0331-05		MICROPHONE (M,W)				1	1				
T94-0049-05		PLANGER	1	1	1	1	1				
W02-0364-00		ENCODER ASS'Y	1	1	1	1	1				
W09-0326-05		LITHIUM BATTERY	1	1	1	1	1				
X41-1580-01		SWITCH UNIT	1	1							
X41-1580-62		SWITCH UNIT			1	1					
X41-1580-01		SWITCH UNIT					1				
X43-1490-11		AVR UNIT	1	1	1	1	1				
X44-1650-11	N	RF UNIT	1								
X44-1650-01	N	RF UNIT		1	1	1	1				
X45-1390-11	N	FINAL UNIT	1								
X45-1390-01	N	FINAL UNIT		1							
X45-1390-61	N	FINAL UNIT			1	1					

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE.NO
			011	021	051	061	071						
X45-1390-01	N	FINAL UNIT					1						
X48-1400-01	N	IF UNIT	1	1	1	1	1						
X49-1180-00		AF UNIT	1	1	1	1	1						
X50-1990-12	N	PLL UNIT	1										
X50-1990-01	N	PLL UNIT		1	1	1	1	1					
X50-2010-10	N	HET UNIT	1										
X50-2000-00	N	HET UNIT		1	1	1	1	1					
X52-1290-60		tone UNIT			1	1							
X53-1410-12	N	CONTROL UNIT	1										
X53-1410-22	N	CONTROL UNIT		1									
X53-1410-52	N	CONTROL UNIT			1								
X53-1410-62	N	CONTROL UNIT				1							
X53-1410-22	N	CONTROL UNIT					1						
X54-1820-11	N	DISPLAY UNIT	1	1	1	1	1						



# TS-811A/B/E PARTS LIST

SWITCH UNIT (X41-1580-XX) (-01 : K,M,X -62 : T,W)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY			REFERENCE NO
			001	061	062	
C91-0757-05		CERAMIC 0.001 50V		7		
E06-1351-05	N	ROUND TYPE CONNECTOR 13P	1	1		
E40-5041-05	*	MINI CONNECTOR 5P	2	2		
E40-5042-05	N*	MINI CONNECTOR 8P	1	1		
E40-5043-05	N*	MINI CONNECTOR 12P	1	1		
E40-0273-05	*	MINI CONNECTOR 2P	2	2		
E40-0573-05	*	MINI CONNECTOR 5P	1	1		
E40-0673-05	*	MINI CONNECTOR 6P	2	2		
E40-0873-05	*	MINI CONNECTOR 8P	1	1		
E40-0973-05	*	MINI CONNECTOR 9P	1	1		
E40-1373-05	*	MINI CONNECTOR 13P	1	1		
RS14AB3A100J		METAL FILM 10 OHM 1W	1	1		R 3
S40-2440-15		PUSH SW	4	4		S 3, 10, 11, 12
S40-2441-15		PUSH SW	1	1		S 4
S50-2402-05		TACT SWITCH	2	2		S 5, 6
S50-1412-05		TACT SWITCH	5			S 1, 2, 7, 8, 9
S50-1412-05		TACT SWITCH		4		S 1, 2, 7, 9
W02-0365-05	N	ROTARY ENCODER(RIT)	1	1		
1SS133		DIODE	8	8		D 1, 2, 3, 4, 5, 6, 7 8

## AVR UNIT (X43-1490-11)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY			REFERENCE NO
			011			
CE04W1C100M		ELECTRO 10 16V	4			C 8, 9, 12, 20
CE04W1C101M		ELECTRO 100 16V	1			C 10
CK45BH102K		CERAMIC 1000P 50V	10			C 5, 7, 11, 14, 15, 17, 18
C90-2004-05	N	ELECTRO 15000 25V	2			C 24, 25, 26
C90-2005-05	N	ELECTRO 1000 25V	2			C 1, 2
C90-0817-05		ELECTRO 1000 16V	1			C 3, 4
C90-0820-05		ELECTRO 470 16V	3			C 22
C91-0117-05		CERAMIC 0.01 50V	1			C 19, 21, 23
C91-1008-05		CERAMIC 0.022 50V	1			C 16
C91-0119-05		CERAMIC 0.047 50V	1			C 13
						C 6
DTC114ES		DIGITAL TR	1			Q 12
E08-0373-05	*	MINI CONNECTOR 3P	1			
E31-3063-05	*	INSIDE CONNECTING WIRE	1			
E40-5044-05	N*	MINI CONNECTOR 2P	1			
E40-5045-05	N*	MINI CONNECTOR 6P	1			
E40-0273-05	*	MINI CONNECTOR 2P	2			
E40-0473-05	*	MINI CONNECTOR 4P	1			
E40-0673-05	*	MINI CONNECTOR 6P	1			
E40-0773-05	*	MINI CONNECTOR 7P	1			
E40-0973-05	*	MINI CONNECTOR 9P	1			
F20-0078-05		INSULATING PLATE	2			
F29-0014-05		INSULATING WASHER	2			
J13-0055-05		FUSE HOLDER	2			
J19-0306-05		HOLDER	1			
L15-0016-05		LOW-FREQUENCY COIL	2			L 1, 2
MT26.2J(A,B)		ZENER DIODE 6.2V	1			D 6
MT28.2J(B,C)		ZENER DIODE 8.2V	1			D 5
NJM4558S		IC	1			Q 10
R12-1429-05		TRIM.POT. 500 OHM	1			VR 1
R12-1428-05		TRIM.POT. 1K OHM	1			VR 2
R92-0674-05	N	RESISTOR BLOCK 10 OHM 2W	2			R 16, 17
S10VB20		RESISTOR BLOCK	1			D 1
UPC78M08H		IC	1			Q 8
U059		DIODE	1			D 4
VD1223		VARISTOR	1			D 7
V06B		DIODE	2			D 2, 3
1SS133		DIODE	2			D 8, 9
2SA1012(Y)		TR	2			Q 1, 5
2SA1048(Y)		TR	1			Q 7
2SC1959(Y)		TR	3			Q 2, 9, 11
2SC2458(Y)		TR	3			Q 3, 4, 6

# PARTS LIST TS-811A/B/E

## RF UNIT (X44-1650-XX) (-01 : M,T,W,X -11 : K)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			001	011									
CC45SL1H101J		CERAMIC 100P 50V	2	2									C 29, 30
CC45CH1H0R5C		CERAMIC 0.5P 50V	2	2									C 16
CC45CH1H050C		CERAMIC 5P 50V	2	2									C 10, 28
CC45CH1H0400D		CERAMIC 6P 50V	2	2									C 38, 42
CC45CH1H100D		CERAMIC 10P 50V	4	4									C 5, 36, 40, 41
CC45CH1H120J		CERAMIC 12P 50V	1	1									C 17
CC45CH1H350J		CERAMIC 33P 50V	1	1									C 3
CC73ECH1H030C		CHIP CAP. 3P 50V	1	1									C 15
CC73ECH1H330J		CHIP CAP. 33P 50V	2	2									C 1, 2
CC73ESL1H101J		CHIP CAP. 100P 50V	3	3									C 6, 12, 19
CC73ESL1H101J		CHIP CAP. 100P 50V	1	1									C 3, 12, 19
CE04W1C100M		ELECTRO 10 16V	1	1									C 26
CK45B1H102K		CERAMIC 1000P 50V	14	14									C 4, 8, 13, 18, 22, 23, 27
CK73EB1H102K		CHIP CAP. 1000P 50V	9	9									C 31, 32, 34, 35, 37, 39, 43
C05-0031-15		TRIMMER 10P	1	1									C 7, 9, 11, 14, 20, 21, 24
C05-0308-05		TRIMMER 4PF	2	2									TC 25, 33
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO	4	4									TC 2
E31-2064-05		CONNECTING WIRE (A)	1	1									TC 1, 3
E31-2089-05		CONNECTING WIRERA	1	1									
L19-0309-05		WIDE BAND TRANSFORMER	2	2									L 2, 3
L34-0824-05		COIL 3.5 2.5T	1	1									L 8
L34-0825-05		COIL 2.5T	1	1									L 18
L34-0908-05		COIL 3 9.5T	2	2									L 4, 19
L34-1052-05		COIL 1.25T	2	2									L 9, 11
L34-1083-05		COIL 1.25T	2	2									L 10
L34-2038-05		TUNING COIL	1	1									L 15, 17
L40-1091-03		INDUCTOR 1 UH	1	1									L 1
L40-1092-14		INDUCTOR 1 UH	1	1									L 12
L71-0248-05		MCF 30.265MHZ	1	1									L 16
L79-0649-05	N	HELICAL	3	3									L 5, 6, 7
L79-0658-05	N	HELICAL BLOCK 430-450MHZ	1	1									L 5, 6, 7
L79-0619-05		HELICAL	1	1									L 13
L79-0659-05	N	HELICAL BLOCK	1	1									L 13
L79-0620-05		HELICAL	1	1									L 14
L79-0660-05	N	HELICAL BLOCK	1	1									L 14
L92-0110-05		FERRITE CORE	1	1									L 20
MA856		DIODE	2	2									D 4, 5
MA856		DIODE	1	1									D 4
MV13		VARISTOR	1	1									D 2
ND487C1-3R		DIODE	1	1									D 1
R12-0433-05		POTENTIOMETER 200 OHM	1	1									VR 1
1SS133		DIODE	1	1									D 3
1SS97		DIODE	1	1									D 5
2SC2026		TR	2	2									Q 1, 2
2SC2458(Y)		TR	1	1									Q 3
2SC2570A		TR	1	1									Q 3
2SC2762		TR	1	1									Q 4
3SK129(S,T)		FET	2	2									Q 6, 7

## FINAL UNIT (X45-1390-XX) (-01 : M,X -11 : K -61 : T,W)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			001	011	061								
CC45CH1H050C		CERAMIC 5P 50V	1	1	1								C 16
CC45SL2H050C		CERAMIC 5P 500V	1	1	1								C 35
CC45CH1H0R5C		CERAMIC 0.5P 50V	1	1	1								C 35
CC45SL2H030C		CERAMIC 3P 500V	3	3	3								C 2, 4, 32
CC45SL2H040C		CERAMIC 4P 500V	1	1	1								C 9
CC45SL2H070D		CERAMIC 7P 500V	1	1	1								C 11
CC45SL2H120J		CERAMIC 12P 500V	1	1	1								C 6
CC45SL1H101J		CERAMIC 100P 50V	1	1	1								C 36
CC73FCH1H0R5C		CHIP CAP. 0.5P 50V	1	1	1								C 34
CE04W1E220M		ELECTRO 22 25V	2	2	2								C 24, 26
CK45B1H102K		CERAMIC 1000P 50V	7	7	7								C 12, 14, 15, 22, 23, 25, 28
CK73EB1H102K		CHIP CAP. 1000P 50V	6	6	6								C 17, 18, 19, 20, 21, 33
CM73F2H160J		CHIP MICA 16P 500V	1	1	1								C 10
CM73F2H150J		CHIP MICA 15P 500V	1	1	1								C 5
CM73F2H220J		CHIP MICA 22P 500V	1	1	1								C 7
CM73F2H040C		CHIP MICA 4P 500V	1	1	1								C 1
CS15E1VR47M		TANTALUM 0.47 35V	1	1	1								C 27
C90-1233-05		ELECTROLYTIC 220 10V	1	1	1								C 29
C90-0871-05		ELECTRO 220 16V	2	2	2								C 30, 31
C90-0838-05		ELECTRO 1 50V	1	1	1								C 13
E04-0161-05		UHF RECEPTACLE	1	1	1								
E04-0162-05	N	N TYPE RECEPTAC	1	1	1								
E29-0440-14		GND WAFER	1	1	1								
F01-0917-05		HEAT SINK	1	1	1								
F09-0405-34		FAN	1	1	1								
F20-0078-05		INSULATING PLATE	1	1	1								
F29-0014-05		INSULATING WASHER	1	1	1								
G02-0519-04		SPRING FOR MOTOR	1	1	1								
L34-1113-05		CHOKE COIL 1.5T	1	1	1								L 5
L34-0908-05		COIL 3 9.5T	1	1	1								L 2
L34-1032-05		COIL 3 3.5T	1	1	1								L 4
L34-1019-05		COIL 3 2.5T	1	1	1								L 3
L34-1040-05		COIL 1T	2	2	2								L 1, 6
L40-1092-14		INDUCTOR 1 UH	1	1	1								L 7
M1308		DIODE	1	1	1								D 2
M1407		DIODE	1	1	1								D 1
M57745	N	POWER MODULE	1	1	1								Q 1
R12-0541-05		TRIM.POT. 100 OHM	1	1	1								VR 2
R12-5517-05		TRIM.POT. 100 OHM	1	1	1								VR 1
S0T1000F		THERMISTOR	1	1	1								TH 1
T42-0302-05		DC MOTOR	1	1	1								
1SS101		DIODE	4	4	4								D 4, 5, 6, 9
1SS133		DIODE	1	1	1								D 7
2SA1012(Y)		TR	1	1	1								Q 2
2SA1048(Y)		TR	1	1	1								Q 4
2SC1815(Y)		TR	1	1	1								Q 3
2SD717		TR.	1	1	1								Q 5

# TS-811A/B/E PARTS LIST

IF UNIT (X48-1400-01)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			001	011									
CC45CH1H150J		CERAMIC 15P 50V	5										C 52, 57, 90, 121, 190
CC45SL1H220J		CERAMIC 22P 50V	3										C 1, 118, 185
CC45CH1H100D		CERAMIC 10P 50V	1										C 119
CC45SL1H470J		CERAMIC 47P 50V	3										C 69, 106, 107
CC45CH1H0R5C		CERAMIC 0.5P 50V	2										C 7, 31
CC45CH1H180J		CERAMIC 18P 50V	1										C 18
CC45SL1H121J		CERAMIC 120P 50V	1										C 165
CC45CH1H220J		CERAMIC 22P 50V	1										C 114
CC45CH1H0R5C		CERAMIC 0.5P 50V	2										C 8, 115
CC45SL2H470J		CERAMIC 47P 500V	1										C 122
CC45CH1H020C		CERAMIC 2P 50V	1										C 103
CC45CH1H330J		CERAMIC 33P 50V	2										C 3, 37
CC45SL1H101J		CERAMIC 100P 50V	1										C 194
CC45CH1H030C		CERAMIC 3P 50V	1										C 92
CC45CH1H121J		CERAMIC 120P 50V	1										C 15
CC45CH1H050C		CERAMIC 5P 50V	1										C 65
CC45SL1H470J		CERAMIC 47P 50V	4										C 54, 101, 108, 126
CC45SL1H221J		CERAMIC 220P 50V	1										C 16
CC45CH1H070D		CERAMIC 7P 50V	1										C 91
CC45CH1H100D		CERAMIC 10P 50V	7										C 19, 24, 25, 48, 61, 74, 97
CC45CH1H080D		CERAMIC 8P 50V	1										C 30
CC45UJ1H020C		CERAMIC 2P 50V	1										C 14
CC45UJ1H100D		CERAMIC 10P 50V	1										C 13
CE04W1H010M		ELECTRO 1 50V	10										C 11, 38, 77, 80, 82, 83, 157
CE04W1H2R2M		ELECTRO 2.2 50V	1										C 163, 172, 174
CE04W1E4R7M		ELECTRO 4.7 25V	6										C 187
CE04W1C100M		ELECTRO 10 16V	3										C 81, 155, 162, 181, 182, 188
CE04W1C220M		ELECTRO 22 16V	1										C 99, 130, 173
CE04W1A470M		ELECTRO 47 10V	3										C 180
CE04W1A221M		ELECTRO 220 10V	1										C 79, 171, 183
CK45B1H331K		CERAMIC 330P 50V	1										C 182
CK45B1H471K		CERAMIC 470P 50V	1										C 131
CK45B1H471K		CERAMIC 470P 50V	1										C 179
CK45B1H102K		CERAMIC 1000P 50V	8										C 4, 5, 9, 12, 42, 94, 135
CK45B1H331K		CERAMIC 330P 50V	2										C 140
CK45B1H471K		CERAMIC 470P 50V	4										C 70, 87
CK45F1H103Z		CERAMIC 0.01 50V	1										C 47, 110, 153, 177
CK45F1H103Z		CERAMIC 0.01 50V	6										C 88
CQ92M1H332K		MYLAR 3300P 50V	1										C 29, 43, 85, 89, 138, 144
CQ92M1H103K		MYLAR 0.01 50V	1										C 175
CQ92M1H153K		MYLAR 0.015 50V	1										C 176
CQ92M1H223K		MYLAR 0.022 50V	1										C 160
CQ92M1H473K		MYLAR 0.047 50V	2										C 169
CQ92M1H683K		MYLAR 0.068 50V	2										C 78, 161
CS15E1V0R1M		TANTALUM 0.1 35V	1										C 166, 170
CS15E1VR47M		TANTALUM 0.47 35V	1										C 178
CS15E1E010M		TANTALUM 1 25V	2										C 39
CS15E1C2R2M		TANTALUM 2.2 16V	1										C 71, 133
C05-0030-15		TRIMMER 20P	1										C 44
C05-0031-15		TRIMMER 10P	2										TC 2
C91-0667-05		CERAMIC 0.0047 50V	1										TC 1, 3
C91-0117-05		CERAMIC 0.01 50V	6										C 167
C91-1008-05		CERAMIC 0.022 50V	11										C 2, 10, 17, 67, 112, 137
C91-0117-05		CERAMIC 0.01 50V	12										C 33, 49, 56, 62, 83, 102, 123
C91-0117-05		CERAMIC 0.01 50V	12										C 125, 146, 149, 150
C91-0117-05		CERAMIC 0.01 50V	12										C 26, 27, 35, 36, 46, 68, 86
C91-0117-05		CERAMIC 0.01 50V	12										C 111, 116, 117, 139, 144

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			001	011									
C91-1008-05		CERAMIC 0.022 50V	32										C 20, 21, 22, 34, 10, 53, 54
C91-0119-05		CERAMIC 0.047 50V	3										C 55, 58, 60, 72, 13, 75, 76
C91-0457-05		CERAMIC 0.022 50V	2										C 84, 93, 95, 96, 100, 104
C91-0457-05		CERAMIC 0.022 50V	4										C 109, 113, 142
C91-0085-05		CERAMIC 0.022 50V	1										C 28, 66
C91-0667-05		CERAMIC 0.0047 50V	2										C 51, 59, 120, 124
C91-0119-05		CERAMIC 0.047 25V	1										C 192
DTC114ES		DIGITAL TR	1										C 164, 184
E04-0154-05		RF COAX. CONNECTOR RA, HET, DO	2										C 40
E23-0512-05		TERMINAL 1P	4										Q 19
E40-0273-05		MINI CONNECTOR 2P	6										
E40-0473-05	*	MINI CONNECTOR 4P	1										
E40-0573-05	*	MINI CONNECTOR 5P	4										
E40-0673-05	*	MINI CONNECTOR 6P	1										
E40-0773-05	*	MINI CONNECTOR 7P	1										
E40-0973-05	*	MINI CONNECTOR 9P	2										
G02-0535-04			3										
L30-0281-15		IFT	4										L 13, 14, 15, 18
L30-0289-05		IFT	5										L 4, 7, 20, 21, 2
L30-0503-05		IFT	3										L 25, 27, 33
L30-0504-05		IFT	1										L 32
L33-0681-05	N	CHOKE COIL 6.8 UH	1										L 5
L34-2231-05	N	TUNING COIL 30MHZ	1										L 8
L34-2038-05		TUNING COIL	3										L 9, 10, 11, 24
L34-2041-05		TUNING COIL	3										L 1, 2, 3
L34-2045-05		TUNING COIL	3										L 23, 28, 29
L40-1501-03		INDUCTOR 15 UH	1										L 26
L40-1511-03		INDUCTOR 150 UH	2										L 17, 19
L40-1021-03		INDUCTOR 1 MH	3										L 16, 35, 36
L40-1011-16		INDUCTOR 100 UH	1										L 38
L40-1011-17		INDUCTOR 100 UH	1										L 30
L40-1011-14		INDUCTOR 100 UH	1										L 37
L71-0249-05	N	XTAL FILTER 10F22S	1										L 12
L72-0342-05		CERAMIC FILTER CFV455F	1										L 31
L77-1254-05	N	XTAL 13.6570MHZ	1										L 4
L79-0446-05		CERAMIC DISCRI CFV455S	1										L 34
MC911		DIODE	2										D 27, 28
MC931		DIODE	4										D 9, 24, 29, 32
ND487C1-3R		DIODE	1										D 16
R12-0421-05		TRIM.POT. 100 OHM	1										VR 8
R12-1429-05		TRIM.POT. 500 OHM	1										VR 6
R12-1430-05		TRIM.POT. 3K OHM	1										VR 2
R12-3443-05		TRIM.POT. 10K OHM	3										VR 1, 4, 7
R12-3450-05	N	TRIM.POT. 20K OHM	1										VR 9
R12-7408-05	N	TRIM.POT. 500KOHM	2										VR 3, 5
TA7302P		IC	2										Q 41, 44

# PARTS LIST TS-811A/B/E

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			001	011									
UPC577H(E,F)		IC	1										Q / 46
UPC4558C		IC	1										Q / 47
1N60		DIODE	4										D / 10, 11, 12, 13
1SS133		DIODE	6										D / 1, 5, 18, 30, 33, 39
1SS133		DIODE	17										D / 2, 4, 6, 7, 8, 15, 17
													D / 21, 22, 23, 25, 26, 31, 34
													D / 35, 36, 37
1S1587		DIODE	1										D / 14
1S1587		DIODE	2										D / 19, 20
1S2208		VOLTAGE VARIABLE	1										D / 3
112-102-2		THERMISTOR	2										D / 2, 3
112-103-2		THERMISTOR	1										D / 1
2CS2458(Y)													Q / 56, 58, 59
2SA1048(Y)		TR	9										Q / 11, 12, 13, 15, 16, 17, 18
													Q / 27, 60
2SC3113(B)		TR	2										Q / 54, 57
2SC2668(Y,D)		TR	2										Q / 1, 2
2SC2668(Y)		TR	5										Q / 4, 36, 38, 40, 48
2SC2240(GR)		TR	1										Q / 29
2SC2458(Y)		TR	23										Q / 3, 9, 14, 23, 24, 28, 30
													Q / 31, 33, 37, 39, 42, 43, 48
													Q / 49, 50, 51, 52, 53, 55
2SK125		FET	1										Q / 35
2SK30A(D)		FET	3										Q / 10, 25, 26
2SK161(GR)		FET	2										Q / 6, 7
3SK73(GR)		FET	6										Q / 5, 8, 20, 21, 22, 32
3SK73(Y)		FET	1										Q / 34

## AF UNIT (X49-1180-00)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			000										
CC4581H390J		CERAMIC 39P 50V	1										C / 32
CC4581H101J		CERAMIC 100P 50V	3										C / 2, 3, 45
CE04W1E4R7M		ELECTRO 4.7 25V	2										C / 20, 21
CE04W1C100M		ELECTRO 10 16V	7										C / 6, 8, 9, 10, 17, 40, 52
CE04W1C220M		ELECTRO 22 16V	1										C / 7
CE04W1A470M		ELECTRO 47 10V	5										C / 5, 22, 25, 46, 56
CE04W1A101M		ELECTRO 100 10V	1										C / 47
CE04BW1HR47M		ELECTRO 0.47 50V	18										C / 27
CE04W1H010M		ELECTRO 1 50V	2										C / 4, 11, 13, 14, 15, 16, 18
CE04BW1H010M		ELECTRO 1 50V	2										C / 19, 26, 28, 29, 35, 37, 38
CK4581H471K		CERAMIC 470P 50V	1										C / 41, 42, 48, 53
CK4581H561K		CERAMIC 560P 50V	1										C / 23, 24
CK4581H102K		CERAMIC 1000P 50V	5										C / 43
CK4581H152K		CERAMIC 1500P 50V	1										C / 31
CQ92M1H332K		MYLAR 3300P 50V	1										C / 36, 39, 44, 61, 63
CQ92M1H103K		MYLAR 0.01 50V	1										C / 33
CQ92M1H123K		MYLAR 0.012 50V	4										C / 12
CQ92M1H104K		MYLAR 0.1 50V	1										C / 34
CS15E1V0R3M		TANTALUM 0.1 35V	1										C / 54, 55, 57, 58
CS15E1C3R5M		TANTALUM 3.3 16V	1										C / 50
C90-0882-05		ELECTRO 220 25V	1										C / 59
C90-0820-05		ELECTRO 470 16V	1										C / 60
E40-0373-05	*	MINI CONNECTOR 3P	1										C / 51
E40-0473-05	*	MINI CONNECTOR 4P	1										C / 49
E40-0573-05	*	MINI CONNECTOR 5P	2										
E40-0673-05	*	MINI CONNECTOR 6P	1										
E40-0773-05	*	MINI CONNECTOR 7P	1										
E40-0973-05	*	MINI CONNECTOR 9P	1										
M83713		IC	1										Q / 11
MC911		DIODE	2										D / 2, 8
MC921		DIODE	1										D / 11
NJN4558S		IC	2										Q / 4, 9
N30-3004-46		PAN HD SCREW	1										
R12-3443-05		TRIM.POT. 10K OHM	2										VR / 1, 3
R12-4413-05		TRIM.POT. 50K OHM	1										VR / 4
R12-5420-05		TRIM.POT. 100KOHM	1										VR / 2
UPC1158H2		IC	1										Q / 5
1N60		DIODE	1										D / 5
1SS133		DIODE	1										D / 10
1SS133		DIODE	6										D / 1, 3, 4, 6, 7, 9
2SA1048(Y)		TR	2										Q / 2, 13
2SC2458(Y)		TR	8										Q / 3, 7, 8, 10, 12, 14, 15
2SC2459(GR)		TR	1										Q / 16
2SK30A(GR)		FET	1										Q / 1

# TS-811A/B/E PARTS LIST

PLL UNIT (X50-1990-XX) (-01 : M,T,W,X -12 : K)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY						REFERENCE NO
			001	011	012				
CC45CH1H060D		CERAMIC 6P 50V	1	1					C 9, 91
CC45CH1H060D		CERAMIC 6P 50V	1	1					C 91
CC45CH1H010C		CERAMIC 1P 50V	1	1					C 125
CC45CH1H070D		CERAMIC 7P 50V	1	1					C 110
CC45SL1H470J		CERAMIC 47P 50V	4	4					C 14, 32, 89, 161
CC45CH1H050C		CERAMIC 5P 50V	2	2					C 66, 152
CC45CH1H060D		CERAMIC 6P 50V	1	1					C 120
CC45CH1H100D		CERAMIC 10P 50V	2	2					C 137, 158
CC45CH1H180J		CERAMIC 18P 50V	3						C 30, 81, 119
CC45CH1H180J		CERAMIC 18P 50V		4					C 30, 81, 119, 164
CC45CH1H080D		CERAMIC 8P 50V	2	2					C 96, 155
CC45SL1H101J		CERAMIC 100P 50V	2	2					C 146, 160
CC45CH1H150J		CERAMIC 15P 50V	1	1					C 95
CC45SL1H221J		CERAMIC 220P 50V	1	1					C 104
CC45CH1H100D		CERAMIC 10P 50V	1	1					C 135
CC45UJ1H270J		CERAMIC 27P 50V	1	1					C 118
CC45SL1H331J		CERAMIC 330P 50V	1	1					C 46
CC45CH1H150J		CERAMIC 15P 50V	1	1					C 65
CC45CH1H180J		CERAMIC 18P 50V	2	2					C 52, 54
CC45CH1H0R5C		CERAMIC 0.5P 50V	3						C 144, 162, 169
CC45CH1H0R5C		CERAMIC 0.5P 50V		2					C 144, 162
CC45CH1H220J		CERAMIC 22P 50V	2	2					C 136, 148
CC45CH1H220J		CERAMIC 22P 50V	4						C 20, 22, 165, 171
CC45CH1H220J		CERAMIC 22P 50V		3					C 20, 22, 171
CC45CH1H030C		CERAMIC 3P 50V	4	4					C 21, 44, 124, 151
CC45CH1H270J		CERAMIC 27P 50V	1	1					C 43
CC45CH1H040C		CERAMIC 4P 50V	1	1					C 64
CC45CH1H270J		CERAMIC 27P 50V	3	3					C 10, 50, 121
CC45CH1H330J		CERAMIC 33P 50V	2	2					C 128, 129
CC45CH1H330J		CERAMIC 33P 50V	3	3					C 3, 40, 85
CC45CH1H050C		CERAMIC 5P 50V	1						C 147
CC45CH1H050C		CERAMIC 5P 50V		2					C 9, 147
CC45CH1H680J		CERAMIC 68P 50V	1	1					C 45
CC45SL1H390J		CERAMIC 39P 50V	4	4					C 82, 84, 86, 88
CC45SL1H470J		CERAMIC 47P 50V	4	4					C 4, 84, 87, 127
CC45CH1H120J		CERAMIC 12P 50V	1	1					C 174
CC45SL1H050C		CERAMIC 5P 50V	1	1					C 178
CC45SL1H330J		CERAMIC 33P 50V	1	1					C 179
CC73ECH1H080D		CHIP CAP. 8P 50V	1	1					C 63
CC73ECH1H220J		CHIP CAP. 22P 50V	1	1					C 1
CC73ECH1H070D		CHIP CAP. 7P 50V	1	1					C 62
CC73ECH1H160J		CHIP CAP. 16P 50V	1	1					C 60
CE04W1E4R7M		ELECTRO 4.7 25V	1	1					C 58
CE04W1A470M		ELECTRO 47 10V	5	5					C 77, 107, 113, 116, 150
CE04W1A101M		ELECTRO 100 10V	3	3					C 69, 99, 122
CK45B1H102K		CERAMIC 1000P 50V	10	10					C 8, 11, 13, 57, 91, 97, 102
CK45F1H103Z		CERAMIC 0.01 50V	4	4					C 117, 145, 166
CK45B1H331K		CERAMIC 330P 50V	1	1					C 47, 138, 143, 156
CK45B1H681K		CERAMIC 680P 50V	2	2					C 175
CK45B1H102K		CERAMIC 1000P 50V	9						C 101, 103
CK45B1H102K		CERAMIC 1000P 50V		9					C 2, 6, 7, 12, 51, 68, 70
CK45B1H102K		CERAMIC 1000P 50V							C 71, 92, 131, 167
CK45B1H102K		CERAMIC 1000P 50V							C 6, 7, 12, 59, 61, 70, 92
CK45B1H102K		CERAMIC 1000P 50V							C 131, 167
CG92M1H222K		MYLAR 2200P 50V	1	1					C 74
CG92M1H822K		MYLAR 8200P 50V	1	1					C 114
CG92M1H223K		MYLAR 0.022 50V	1	1					C 75

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY						REFERENCE NO
			001	011	012				
CG92M1H473K		MYLAR 0.047 50V	1	1					C 56
CG92M1H683K		MYLAR 0.068 50V	1	1					C 111
CS15E1VR22M		TANTALUM 0.22 35V	1	1					C 49
CS15E1VR47M		TANTALUM 0.47 35V	1	1					C 78
CS15E1E010M		TANTALUM 1 25V	2	2					C 72, 73
C05-0062-05		TRIMMER 6P	1	1					TC 2
C05-0030-15		TRIMMER 20P	1	1					TC 1
C05-0067-05		TRIMMER 25P	2	2					TC 3, 4
C91-0117-05		CERAMIC 0.01 50V	15	15					C 5, 19, 23, 24, 26, 33, 34
C91-0117-05		CERAMIC 0.01 50V							C 39, 51, 76, 79, 90, 96, 123
C91-1008-05		CERAMIC 0.022 50V	7	7					C 154
C91-1008-05		CERAMIC 0.022 50V	23	23					C 41, 48, 53, 108, 115, 126, 149
C91-1008-05		CERAMIC 0.022 50V							C 15, 17, 25, 26, 27, 28, 35
C91-1008-05		CERAMIC 0.022 50V							C 36, 37, 38, 55, 80, 105, 106
C91-1008-05		CERAMIC 0.022 50V							C 112, 132, 133, 134, 140, 153
C91-1008-05		CERAMIC 0.022 50V							C 172, 173, 176
C91-1008-05		CERAMIC 0.022 50V							C 16, 18, 31, 42, 98, 100, 109
C91-1008-05		CERAMIC 0.022 50V							C 130, 139, 141, 142, 157, 159, 163
C91-0498-05		CERAMIC 0.35P 50V		1					C 168
C91-0498-05		CERAMIC 0.35P 50V							C 169
E04-0154-05		RF COAX. CONNECTOR RA, HET, DO	1	1					
E23-0512-05		TERMINAL 1P	9	9					
E33-1641-00			1						
E40-0473-05		MINI CONNECTOR 4P	2	2					
E40-0673-05		MINI CONNECTOR 6P	1	1					
E40-0873-05		MINI CONNECTOR 8P	1	1					
F11-0818-14		SHIELD CASE (VCO TOP CASE)	1	1					
L30-0289-05		IFT	1	1					L 44
L30-0281-15		IFT	2	2					L 9, 13
L32-0624-05		OSCILLATING COI	1	1					L 21
L32-0639-05		OSCILLATING COIL 50MHZ	1	1					L 33
L33-0647-05		CHOKO COIL 18 UH	1	1					L 14
L33-0668-05		INDUCTOR 3.3 UH	1	1					L 20
L34-0894-05		COIL 3 5T	2	2					L 25, 26
L34-0908-05		COIL 3 9.5T	3	3					L 24, 27, 35
L34-1033-05		COIL 3 8.5T	3	3					L 1, 2, 3
L34-0683-05		TUNING COIL	1	1					L 4
L34-0749-05		TUING COIL	2	2					L 45, 46
L34-2041-05		TUNING COIL	2	2					L 47, 48
L34-2232-05		TUNING COIL 51.2MHZ	2	2					L 39, 40
L34-3064-05		TUNING COIL	2	2					L 5, 7
L34-3066-05		TUNING COIL	1	1					L 6
L40-6891-03		INDUCTOR 68 UH	3	3					L 37, 38, 43
L40-1011-17		INDUCTOR 100 UH	2	2					L 32, 34
L40-1511-03		INDUCTOR 150 UH	2	2					L 12, 15
L40-3311-03		INDUCTOR 330 UH	2	2					L 30, 31
L40-1021-03		INDUCTOR 1 MH	3	3					L 11, 16, 18
L40-1092-16		INDUCTOR 1 UH	1	1					L 22
L40-1011-14		INDUCTOR 100 UH	2	2					L 23, 36
L40-4711-13		INDUCTOR 470 UH	1	1					L 42
L40-1011-13		INDUCTOR 100 UH	1	1					L 49
L72-0346-05		CERAMIC FILTER SFE11.025MJ-A	2	2					L 8, 10
L77-0950-05		XTAL 10.695MHZ	1	1					L 17
L77-0951-05		XTAL 10.6935MHZ	1	1					L 19

# PARTS LIST TS-811A/B/E

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			001	011	012								
L77-1255-05	N	TCXO 10.240MHZ	1	1									L 41
L79-0644-05	N	BPF BPJ83	2	2									L 28, 29
MAB56		DIODE	2	2									D 4, 5
MC145155P=K		IC	1	1									Q 21
MC145156P		IC	1	1									Q 19
MC921		DOUBLE DIODE	2	2									Q 6, 8
MC921		DIODE	1	1									D 7
MS4459L		IC	1	1									Q 23
NJM78L05A		IC	1	1									Q 37
R12-1405-05		TRIM.POT. 1K OHM	3	3									VR 1, 2, 3
SN16913P		IC	4	4									Q 3, 4, 6, 31
SN74LS90N		IC	2	2									Q 22, 36
TA7302P		IC	1	1									Q 30
UPB555C		IC	1	1									Q 20
1SV50		DIODE	3	3									D 1, 2, 3
2SA104B(Y)		TR	1	1									Q 15
2SC2459(BL)		TR	3	3									Q 12, 14, 25
2SC2459(BL)		TR	3	3									Q 13, 26, 27
2SC2458(Y)		TR	3	3									Q 9, 34, 35, 39
2SC2458(Y)		TR	3	3									Q 16, 33, 38
2SC2787(L)		TR	1	1									Q 7, 8, 41
2SC2668(Y,O)		TR	1	1									Q 24
2SC2668(Y,O)		TR	6	6									Q 32
2SC2668(Y)		TR	1	1									Q 5, 11, 17, 18, 29, 40
2SC2668(Y)		TR	1	1									Q 1
2SK192A(GR)=N		FET	2	2									Q 10, 28
3SK73(Y)		FET	1	1									Q 2

## HET UNIT (X50-2000-00) (M,T,W,X)

PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY										REFERENCE NO
			000										
CC4SCH1H0R5C		CERAMIC 0.5P 50V	2										C 14, 27
CC4SCH1H0S0C		CERAMIC 5P 50V	3										C 3, 9, 38
CC4SCH1H100D		CERAMIC 10P 50V	3										C 15, 32, 44
CC4SCH1H220J		CERAMIC 22P 50V	2										C 23, 28
CC4SL1H101J		CERAMIC 100P 50V	5										C 6, 11, 18, 34, 40
CC73ECH1H100D		CHIP CAP. 10P 50V	1										C 2
CC73ECH1H220J		CHIP CAP. 22P 50V	1										C 1
CC73ECH1H330J		CHIP CAP. 33P 50V	1										C 43
CE04W1C100M		ELECTRO 10 16V	1										C 12
CK45B1H471K		CERAMIC 470P 50V	2										C 16, 22
CK45B1H102K		CERAMIC 1000P 50V	14										C 4, 5, 7, 10, 17, 19, 21
CK73EB1H102K		CHIP CAP. 1000P 50V	4										C 25, 26, 29, 33, 35, 39, 41
C05-0062-05		TRIMMER 6P	3										C 8, 13, 20, 31, 36, 42
C05-0051-13		TRIMMER 10P	1										TC 1, 2, 3
C91-0498-05		CERAMIC 0.35P 50V	1										TC 4
C91-0757-05		CERAMIC 0.001 50V	1										C 37
C91-1008-05		CERAMIC 0.022 50V	1										C 30
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO	2										C 24
E23-0512-05		TERMINAL 1P	5										
E31-2044-05	*	CONNECTING WIRE (A)	1										TP 1, 4, 5, 6, 7
E31-3079-05	N	LEAD WITH CONNECTOR	1										
E40-0211-05		MINI CONNECTOR 2P	1										TP 3
L19-0309-05		WIDE BAND TRANSFORMER	2										L 2, 3
L34-2041-05		TUNING COIL	2										L 8, 9
L34-0824-05		COIL 3.5 2.5T	1										L 6
L34-0893-05		COIL 3 4T	1										L 14
L34-0908-05		COIL 3 9.5T	1										L 1
L34-1015-05		COIL 3 4.5T	1										L 12
L34-1016-05		COIL 3 4.5T	1										L 11
L34-1114-05	N	COIL 3 4.5T	1										L 13
L40-1092-14		INDUCTOR 1 UH	1										L 7
L79-0650-05	N	HELICAL 290MHZ	1										L 10
L79-0651-05	N	HELICAL 405MHZ	2										L 4, 5
MV13		VARISTOR	1										D 2
NQ487C1-3R		DIODE	1										D 1
2SC2026		TR	5										Q 1, 2, 5, 6, 7
2SC2570A		TR	1										Q 3
2SC2787(L)		TR	1										Q 4

## TS-811A/B/E PARTS LIST

**HET UNIT (X50-2010-10) (K)**

HET UNIT (X50-2010-10) (K)					DISTINCTION & QUANTITY					REFERENCE NO	
PART.NO	NOTE	NAME & DESCRIPTION		OIO							
CC45CH1H0R5C		CERAMIC	0.5P 50V	2							C , 14, 27
CC45CH1H030C		CERAMIC	3P 50V	1							C , 46
CC45CH1H050C		CERAMIC	5P 50V	3							C , 4, 9, 65
CC45CH1H070D		CERAMIC	7P 50V	1							C , 38
CC45CH1H100D		CERAMIC	10P 50V	2							C , 44, 52
CC45CH1H120J		CERAMIC	12P 50V	1							C , 56
CC45CH1H150J		CERAMIC	15P 50V	1							C , 15
CC45CH1H220J		CERAMIC	22P 50V	4							C , 24, 29, 33, 60
CC45CH1H330J		CERAMIC	33P 50V	1							C , 48
CC45SH1H560J		CERAMIC	56P 50V	1							C , 50
CC45SL1H101J		CERAMIC	100P 50V	11							C , 3, 7, 12, 19, 35, 36, 40 C , 41, 58, 62, 63
CC73ECH1H150J				2							C , 1, 2
CC73ECH1H330J		CHIP CAP.	33P 50V	1							C , 43
CC73ECH1H101J		CHIP CAP.	100P 50V	3							C , 6, 11, 18
CK45BH1H471K		CERAMIC	470P 50V	2							C , 16, 21
CK45BH1H102K		CERAMIC	1000P 50V	8							C , 23, 25, 28, 31, 39, 45, 49 C , 53, 66
CK45BH1H222K		CERAMIC	2200P 50V	2							C , 26, 54
CK73EB1H102K		CHIP CAP.	1000P 50V	16							C , 5, 8, 10, 13, 17, 20, 30 C , 32, 34, 37, 42, 47, 57, 59 C , 61, 64
C05-0030-15		TRIMMER	20P	1							C , 3
C05-0031-15		TRIMMER	10P	1							TC , 2
C05-0062-05		TRIMMER	6P	1							TC , 1
C91-049B-05		CERAMIC	0.35P 50V	1							C , 55
C91-0085-05		CERAMIC	0.022 50V	1							C , 67
C91-0757-05		CERAMIC	0.001 50V	1							C , 51
C91-1008-05		CERAMIC	0.022 50V	1							C , 22
E04-0154-05		RF COAX. CONNECTOR RA,HET,DO		2							L , 2, 3
L19-0309-05		WIDE BAND TRANSFORMER		2							L , 17
L33-0026-05		CHOKE COIL		1							L , 8, 9, 18, 19
L34-2041-05		TUNING COIL		4							L , 6
L34-0824-05		COIL	3.5 2.5T	1							L , 13
L34-0893-05		COIL	3 4T	1							L , 1
L34-0908-05		COIL	3 9.5T	1							L , 12
L34-1114-05		COIL	3 4.5T	1							L , 7, 23, 24
L40-1092-14		INDUCTOR	1 UH	3							L , 14, 22
L40-1011-14		INDUCTOR	100 UH	2							L , 16
L40-1092-16		INDUCTOR	1 UH	1							L , 15
L77-1270-05	N	XTAL	42.38857MHZ	1							L , 10, 11, 20, 21
L79-0650-05		HELICAL	290MHZ	4							L , 4, 5
L79-0657-05	N	HELICAL	600-620MHZ	2							
MV13		VARISTOR		1							D , 2
N0487C1-3R		DIODE		1							D , 1
T12-102-2		THERMISTER		1							TH , 1
2SA933S(Q)	N	TR		3							Q , 10, 11, 12
2SC2024		TR		6							Q , 2, 3, 5, 6, 7, 15, 16
2SC2787(L)		TR		3							Q , 4, 13, 14
2SC2570A		TR		1							Q , 1
2SC1740S(Q)	N	TR		2							Q , 8, 9

**TONE UNIT (X52-1290-60) (T,W)**

[illegible]



# PARTS LIST TS-811A/B/E

CONTROL UNIT (X53-1410-XX) (-12 : K -22 : M,X -52 : T -62 : W)

CONTROL UNIT (X53-1410-XX) (-12: K -22: M, X -32: T -42: V)			DISTINCTION & QUANTITY								REFERENCE.NO	
PART.NO	NOTE	NAME & DESCRIPTION	012	021	022	051	052	061	062			
CC45CH1H150J		CERAMIC 15P 50V	2	2	2	2	2	2	2			C 52, 53
CC45CH1H270J		CERAMIC 27P 50V	1	1	1	1	1	1	1			C 73
CC45CH1H270J		CERAMIC 27P 50V	1	1	1	1	1	1	1			C 72
CC45CH1H330J		CERAMIC 33P 50V	1	1	1	1	1	1	1			C 54
CC45SL1H121J		CERAMIC 120P 50V	1	1	1	1	1	1	1			C 44
CE04W1C221M		ELECTRO 220 16V	2	2	2	2	2	2	2			C 65, 69
CE04W1R471M		ELECTRO 470 10V	1	1	1	1	1	1	1			C 66
CE04W1R471M		ELECTRO 0.47 50V	1	1	1	1	1	1	1			C 19
CF92V1H104J		POLYESTER 0.1 50V	2	2	2	2	2	2	2			C 47, 79
CK45B1H182K		CERAMIC 1800P 50V	1	1	1	1	1	1	1			C 37
CQ92M1H182K		MYLAR 1800P 50V	1	1	1	1	1	1	1			C 21
CQ92M1H102K		MYLAR 1000P 50V	1	1	1	1	1	1	1			C 43
CQ92M1H682K		MYLAR 6800P 50V	1	1	1	1	1	1	1			C 46
CS15E1A100M		TANTALUM 10 10V	1	1	1	1	1	1	1			C 22
C90-0838-05		ELECTRO 1 50V	1	1	1	1	1	1	1			C 45
C90-0846-05		ELECTRO 33 10V	2	2	2	2	2	2	2			C 48, 50
C90-0847-05		ELECTRO 47 10V	1	1	1	1	1	1	1			C 42
C90-0837-05		ELECTRO 0.1 50V	1	1	1	1	1	1	1			C 41
C91-0457-05		CERAMIC 0.022 50V	8	8	8	8	8	8	8			C 7, 8, 16, 30, 31, 70, 71
C91-0457-05		CERAMIC 0.022 50V	2	2	2	2	2	2	2			C 84
C91-0753-05		CERAMIC 470P 50V	4	4	4	4	4	4	4			C 26, 64
C91-0117-05		CERAMIC 0.01 50V	1	1	1	1	1	1	1			C 1, 9, 10, 36
C91-0757-05		CERAMIC 0.001 50V	21	21	21	21	21	21	21			C 86
C91-0757-05		CERAMIC 0.001 50V	21	21	21	21	21	21	21			C 2, 3, 4, 5, 6, 11, 12
C91-0757-05		CERAMIC 0.001 50V										C 13, 14, 29, 32, 35, 38, 39
C91-0757-05		CERAMIC 0.001 50V										C 40, 68, 79, 80, 81, 82
C91-0757-05		CERAMIC 0.001 50V										C 83
C91-0753-05		CERAMIC 470P 50V	4	4	4	4	4	4	4			C 56
C91-0757-05		CERAMIC 0.001 50V										C 27, 28, 77, 78
C91-0769-05		CERAMIC 0.01 50V										C 15, 18, 20, 23, 24, 33, 34
C91-0769-05		CERAMIC 0.01 50V										C 51, 55, 67, 76, 85
C91-0769-05		CERAMIC 0.01 50V	5	5	5	5	5	5	5			C 17, 25, 63, 74, 75
DAP401	N	DIODE	6	6	6	6	6	6	6			D 1, 3, 4, 5, 6, 7
DTA114YS		DIGITAL TR	3	3	3	3	3	3	3			Q 1, 3, 5
DTA114YS	N	DIGITAL TR	3	3	3	3	3	3	3			Q 2, 4, 6
DTC143TS		DIGITAL TR	2	2	2	2	2	2	2			Q 11, 12
E02-0122-05	N	IC SOCKET 24PIN	1	1	1	1	1	1	1			
E23-0512-05		TERMINAL 1P	2	2	2	2	2	2	2			
J32-0761-04		STUD & BOSS (STICK TYPE)	1	1	1	1	1	1	1			
L77-1206-05	N	XTAL 3.6864MHZ	1	1	1	1	1	1	1			X 2
L78-0009-05	N	CERAMIC OSC 4MHZ	1	1	1	1	1	1	1			X 1
MB8418-20LP-GR	N	IC 8BIT X2(RAM)	1	1	1	1	1	1	1			IC 14
MC14584BCP		IC	1	1	1	1	1	1	1			IC 11
MC14069UBCP		IC	2	2	2	2	2	2	2			IC 1, 2
MN6127A		IC	1	1	1	1	1	1	1			IC 19
MTZ12JB		ZENER DIODE 12V	1	1	1	1	1	1	1			D 17
MTZ9.1JB		ZENER DIODE 9.1V	1	1	1	1	1	1	1			D 11
M5L8255AP-5	N	IC										IC 16
N30-3006-46		PAN HD SCREW	2	2	2	2	2	2	2			
N30-3010-46		PAN HD SCREW	1	1	1	1	1	1	1			
N87-2606-46		TAPPING SCREW	2	2	2	2	2	2	2			

PART.NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY								REFERENCE.NO
			012	021	022	051	052	061	062		
PST518A	N	IC	1	1	1	1	1	1	1	IC / 10	
R12-4416-05	N	TRIM.POT 50K	1	1	1	1	1	1	1	VR / 1	
R90-0515-05		RESISTOR BLOCK 10K	2	2	2	2	2	2	2	R / 3, 15	
R90-0521-05		RESISTOR BLOCK 47K X7	1	1	1	1	1	1	1	R / 89	
R90-0532-05		RESISTOR BLOCK 27K X5	1	1	1	1	1	1	1	R / 83	
R90-0534-05		RESISTOR BLOCK 10K X5	1	1	1	1	1	1	1	R / 38	
R90-0578-05	N	RESISTOR BLOCK 5.1K X10	1	1	1	1	1	1	1	R / 70	
SN74LS05N		IC	1	1	1	1	1	1	1	IC / 23	
SN74LS32N		IC	1	1	1	1	1	1	1	IC / 23	
SN74LS138N		IC	1	1	1	1	1	1	1	IC / 15	
SN74LS174N		IC	3	3	3	3	3	3	3	IC / 12, 17, 22	
TC4011BP		IC OR BU4011BP	7	7	7	7	7	7	7	IC / 3, 4, 5, 6, 7, 8, 9	
TC2049UBP		IC	1	1	1	1	1	1	1	IC / 1, 2	
TMP8255AP-5	N	IC	1	1	1	1	1	1	1	IC / 16	
UPC658C		IC	1	1	1	1	1	1	1	IC / 18	
LPC7805H		IC	1	1	1	1	1	1	1	IC / 21	
UPD1802G-088-36		MICRO-PROCESSOR	1	1	1	1	1	1	1	IC / 16	
UPD8255AC-5	N	IC	1	1	1	1	1	1	1	IC / 20	
UPD7507G-575-00		MICRO-PROCESSOR FOR DCS	1	1	1	1	1	1	1	IC / 20	
1SS133		DIODE	19	19	19	19	19	19	19	D / 2, 8, 9, 10, 13, 14, 15	
1SS133		DIODE	2	2	2	2	2	2	2	D / 18, 19, 20, 21, 22, 23, 24	
1SS133		DIODE	3	3	3	3	3	3	3	D / 25, 26, 27, 28, 29	
1SS133		DIODE	2	2	2	2	2	2	2	D / 33, 35	
1SS133		DIODE	3	3	3	3	3	3	3	D / 12, 30, 35	
1SS133		DIODE	1	1	1	1	1	1	1	D / 16, 30, 33, 34, 35	
1SS133		DIODE	1	1	1	1	1	1	1	D / 16, 30, 31, 32, 33, 34, 35	
2SA1307(Y)	N	TR	1	1	1	1	1	1	1	Q / 14	
2SA1015(Y)		TR	2	2	2	2	2	2	2	Q / 18, 20	
2SA1048(Y)		TR	1	1	1	1	1	1	1	Q / 21	
2SA1115(E)		TR	1	1	1	1	1	1	1	Q / 21	
2SA1015(Y)		TR	3	3	3	3	3	3	3	Q / 16, 17, 19	
2SC1959(Y)		TR	1	1	1	1	1	1	1	Q / 13	
2SC458(Y)		TR	4	4	4	4	4	4	4	Q / 7, 8, 9, 10	
2SC2703(O,Y)		TR	1	1	1	1	1	1	1	Q / 15	

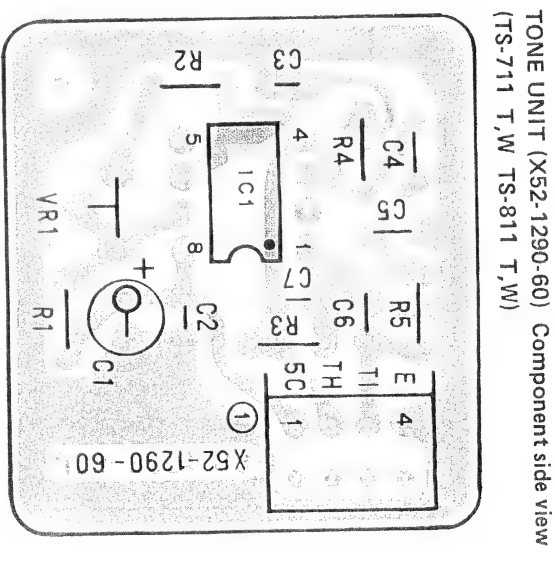
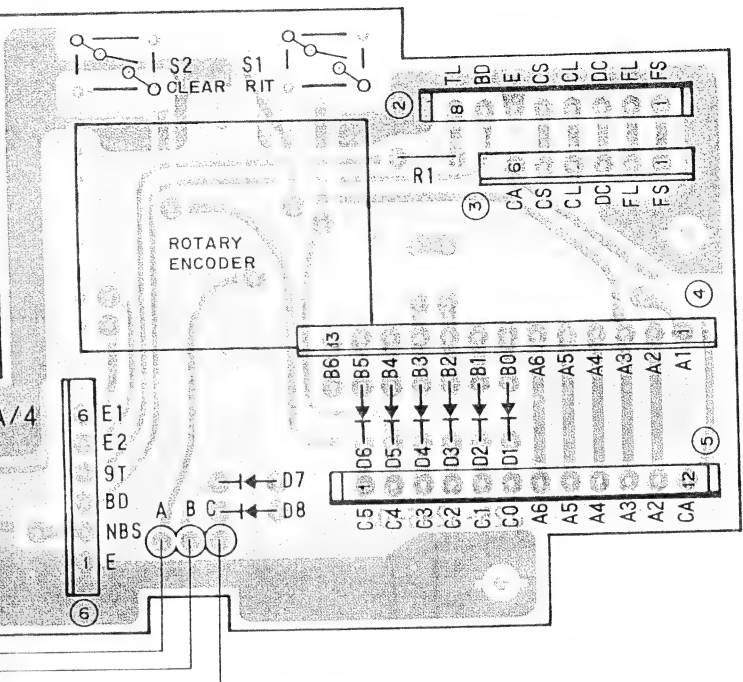
# TS-811A/B/E PARTS LIST

## DISPLAY UNIT (X54-1820-11)

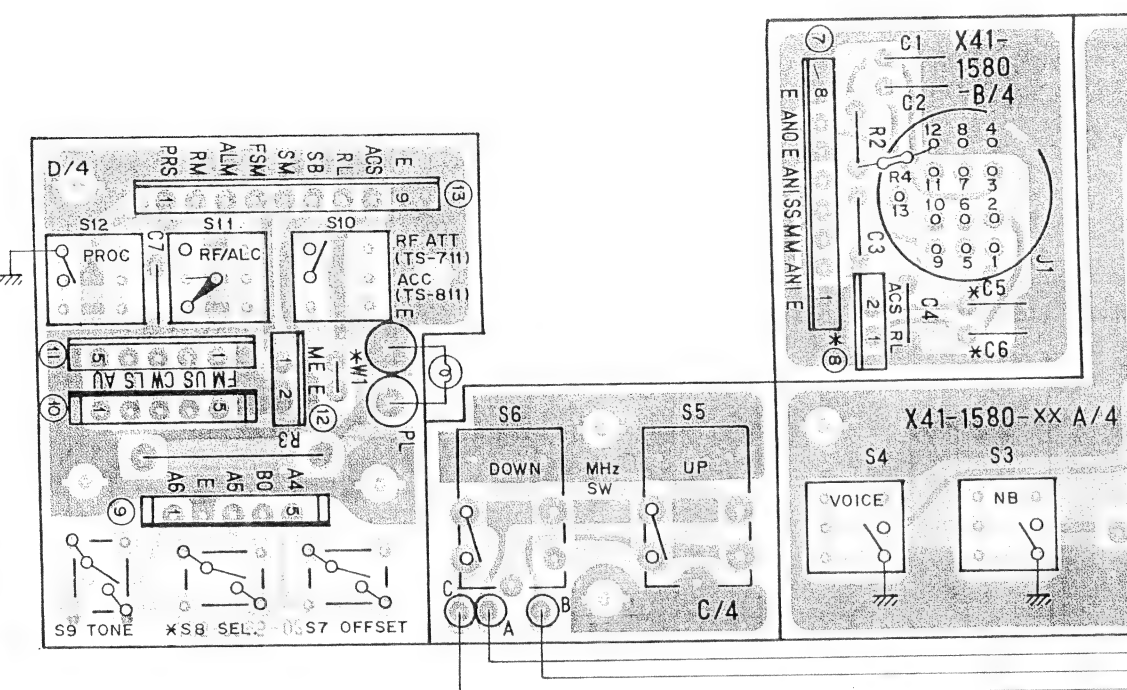
PART NO	NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY							REFERENCE NO
			011							
CC455L1H101J		CERAMIC 100P 50V	1							C / 20
CE04W1V100M		ELECTRO 10 35V	2							C / 12, 13
CE04W1C100M		ELECTRO 10 16V	2							C / 10, 14
CE04W1C330M		ELECTRO 33 16V	1							C / 8
CE04W1A470M		ELECTRO 47 10V	1							C / 5
CK45B1H102K		CERAMIC 1000P 50V	8							C / 1, 2, 3, 15, 16, 17, 18
C092M1H103K		MYLAR 0.01 50V	1							C / 19
C092M1H223K		MYLAR 0.022 50V	1							C / 11
C91-0769-05		CERAMIC 0.01 50V	1							C / 4
C91-1008-05		CERAMIC 0.022 50V	2							C / 6
DTA124EF	N	DIGITAL TR	2							C / 7, 9
E06-0858-05		BP METAL SOCKET	1							Q / 11, 12
E11-0401-05		EARPHONE JACK EXT.SP	1							
E11-0407-05		EARPHONE JACK	1							
E11-0413-05		PHONE JACK PHONES	1							
E11-0422-05	N	KEY JACK KEY	1							
E31-3052-15	N	TAPE CABLE 10X25MM	1							
E31-3053-15	N	TAPE CABLE 12X25MM	1							
E31-3054-05	N	TAPE CABLE 4X50MM	1							
E31-3055-05	N	TAPE CABLE 11X50MM	1							
E31-3056-05	N	TAPE CABLE 12X50MM	1							
FIP11FM7		DISPLY TUBE	1							V / 1
L19-0323-05		TRANSFORMER	1							T / 1
L30-0304-05		IPT	1							L / 2
L40-1511-14		INDUCTOR 150 UH	1							L / 3
L40-1011-04		INDUCTOR 100 UH	1							L / 1
MC931		DIODE	2							D / 3, 4
MT26.2JA		DIODE	1							D / 2
MT27.5JA		DIODE	1							D / 5
R12-2413-05		TRIM.POT.(5K)	1							VR / 6
R12-3446-05		TRIM.POT.(30K)	1							VR / 3
R12-5420-05		TRIM.POT. 100KOHM	1							VR / 7
R12-7403-05		TRIM.POT. 500KOHM	1							VR / 8
R19-3420-05		POTENTIOMETER	1							VR / 4
R19-9409-05	N	POTENTIOMETER	1							VR / 2
R24-9404-05	N	POTENTIOMETER	1							VR / 3
R90-0520-05		RESISTOR BLOCK 47K OHM X5	1							R / 25
R90-0522-05		RESISTOR BLOCK 47K OHM X6	1							R / 24
R90-0579-05	N	RESISTOR BLOCK 47K OHM X11	1							R / 23
TCS066BP		IC	2							Q / 7, 8
UPA80C		IC	1							Q / 6
UPD763C	N	IC	1							Q / 5
1N40		DIODE	1							D / 1
112-351-2		THERMISTOR	1							TH / 1
2SC1959(Y)		TR	2							Q / 9, 10
2SC2458(Y)		TR	1							Q / 4

# PC BOARD VIEWS TS-711/811

SWITCH UNIT (X41-1580-XX) Component side view  
 (-01 : TS-811 K,M,X -11 : TS-711 K,M1,M2,X -61 : TS-711 T,W -62 : TS-811 T,W)



IC1 : NE555P



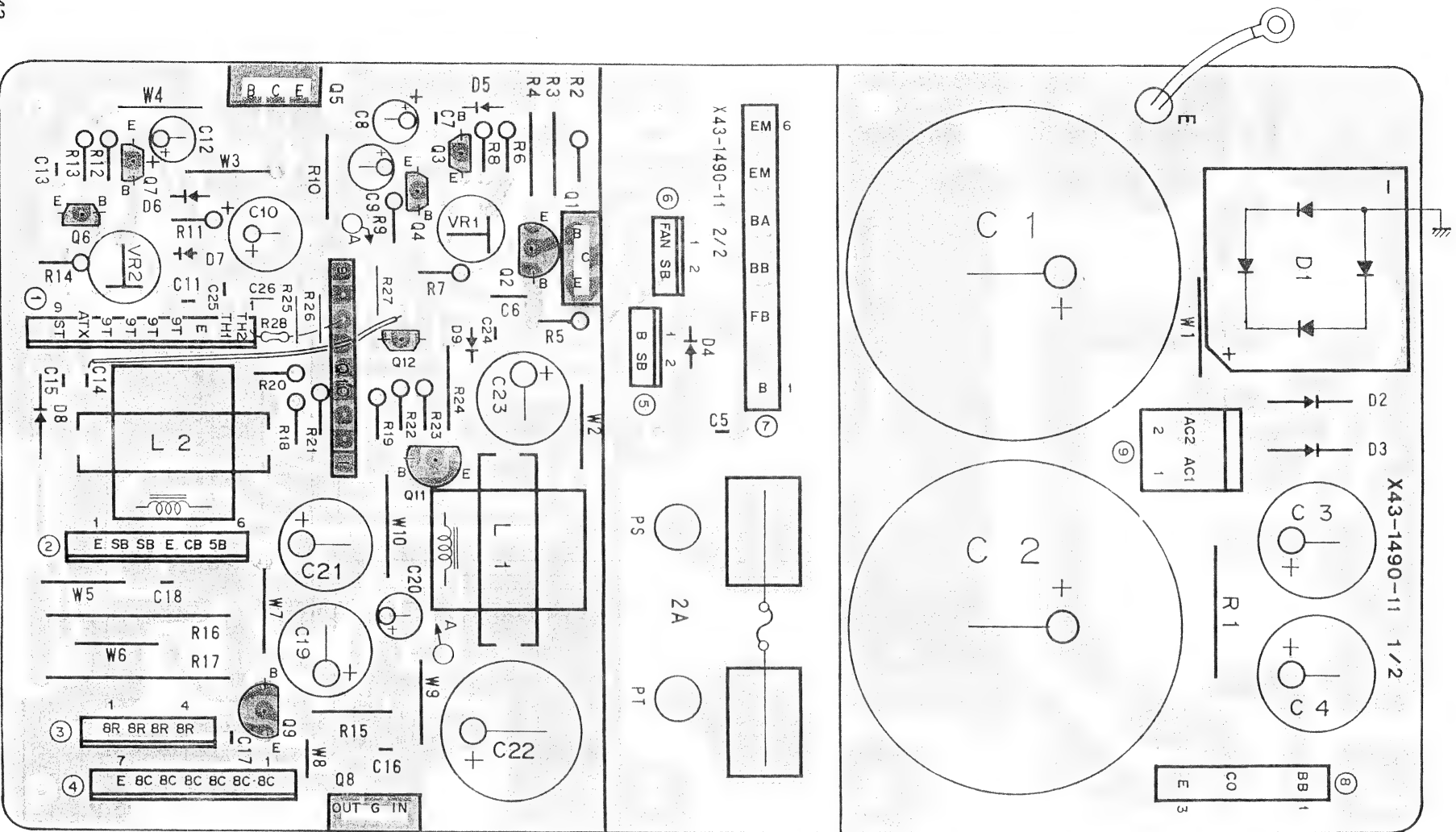
	⑧	SW8	C5,6	W1
TS-711	K,M1,M2,X	X	X	X
TS-711	T,W	X	X	X
TS-811	K,M,X	X	X	X
TS-811	T,W	X	X	X

O : Used X : Not used

D1-8 : 1SS133

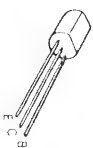
# TS-711/811 PC BOARD VIEW

AVR UNIT (X43-1490-11) Component side view

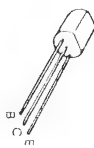


Q1,5 : 2SA1012(Y) Q2,9,11 : 2SC1959(Y) Q3,4,6 : 2SC2458(Y) Q7 : 2SA1048(Y) Q8 :  $\mu$ PC78M08H Q10 : NJM4558S Q12 : DTC114ES  
 D1 : S10VB20 D2,3 : V06B D4 : U05B D5 : MTZ8.2J(B,C) D6 : MTZ6.2J(A,B) D7 : VD1223 D8,9 : 1SS133

2SC1959



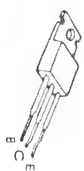
2SC538-22-A



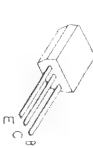
2SC2026  
2SC2570A



2SA1012



2SA1048  
2SC2458



2SC2762



2SK192A



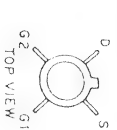
DTC114ES



$\mu$ PC78M08H



3SK122  
3SK129

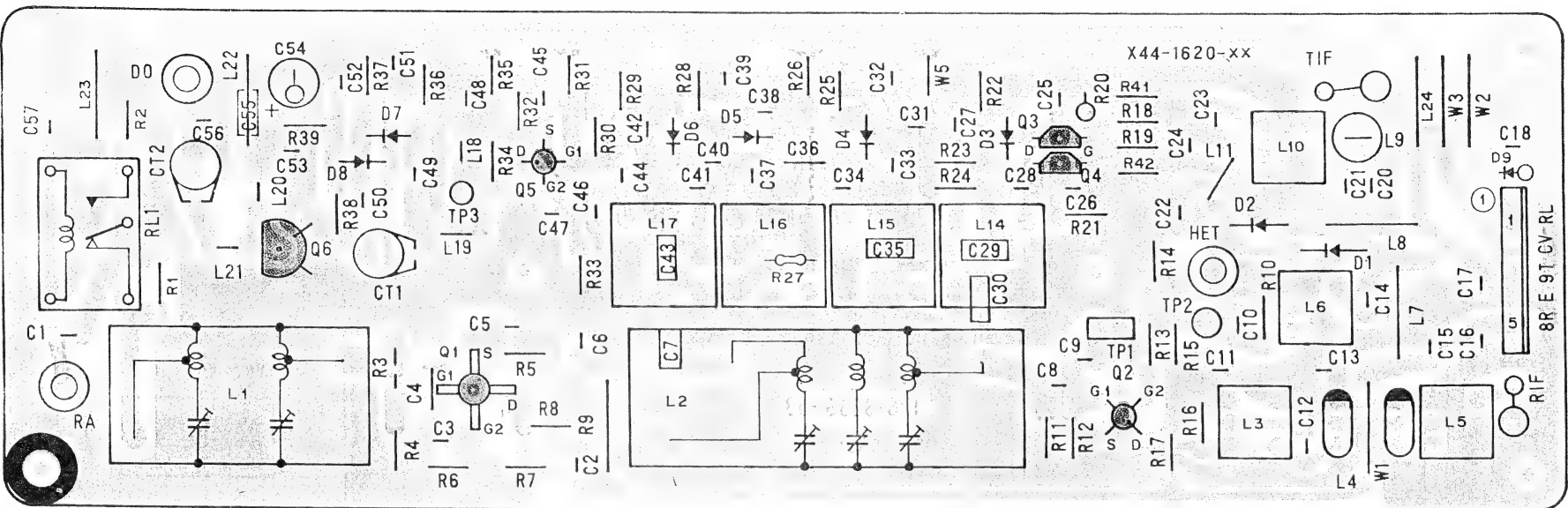


NJM4558S



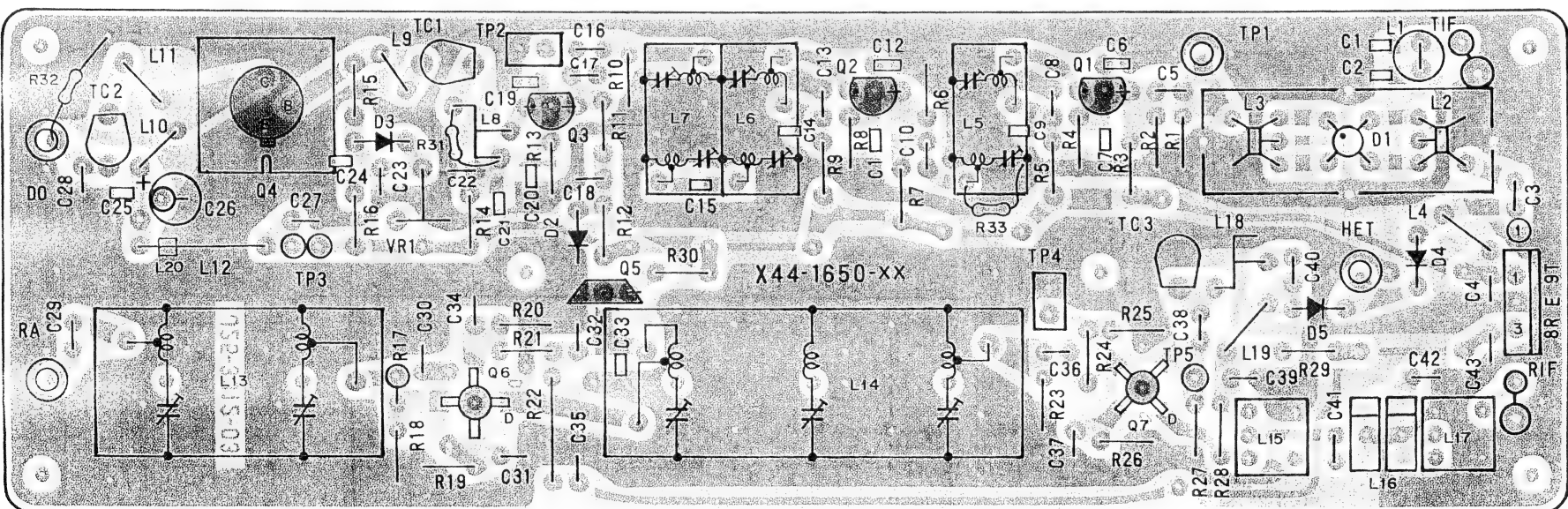
# PC BOARD VIEWS TS-711/811

RF UNIT (X44-1620-XX) Component side view  
(-01 : TS-711 T,W -11 : TS-711 K,M1,M2,X)



Q1: 3SK129(Q,R) Q2,5: 3SK122(L) Q3,4: 2SK192A(GR)\*N Q6: 2SC2538-22-A  
D1,2: MA856 D3-7: 1SV123 D8,9: 1SS133

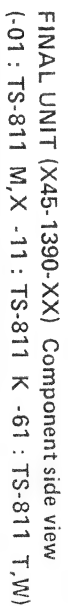
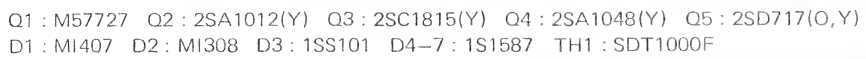
RF UNIT (X44-1650-XX) Component side view  
(-01 : TS-811 M,T,W,X -11 : TS-811 K)



Q1,2: 2SC2026 Q3: 2SC2570A Q4: 2SC2762 Q5: 2SC2458(Y) Q6,7: 3SK129(S,T)  
D1: ND487C1-3R D2: MV13 D3: 1SS133 D4: MA856 D5: MA856 (M,T,W,X), 1SS97 (K)



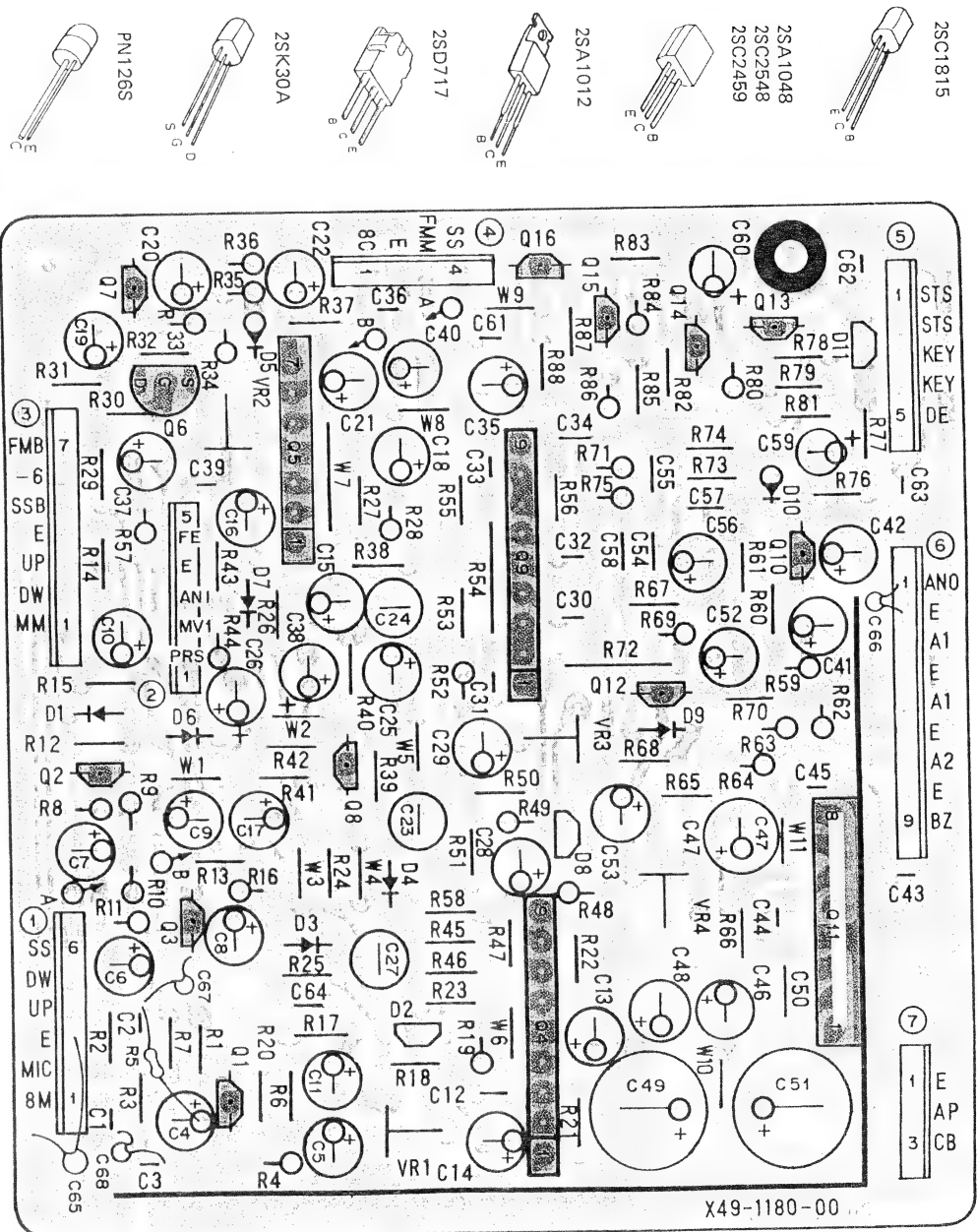
FINAL UNIT (X45-1380-11) Component side view  
(TS-711 K,M1,M2,T,W,X)



Q1 : M57745 Q2 : 2SA1012(Y) Q3 : 2SA1018(Y) Q4 : 2SA1048(Y) Q5 : 2SD717(O,Y)  
D1 : MI407 D2 : MI308 D4-7,9 : 1SS101 TH1 : SDT1000F

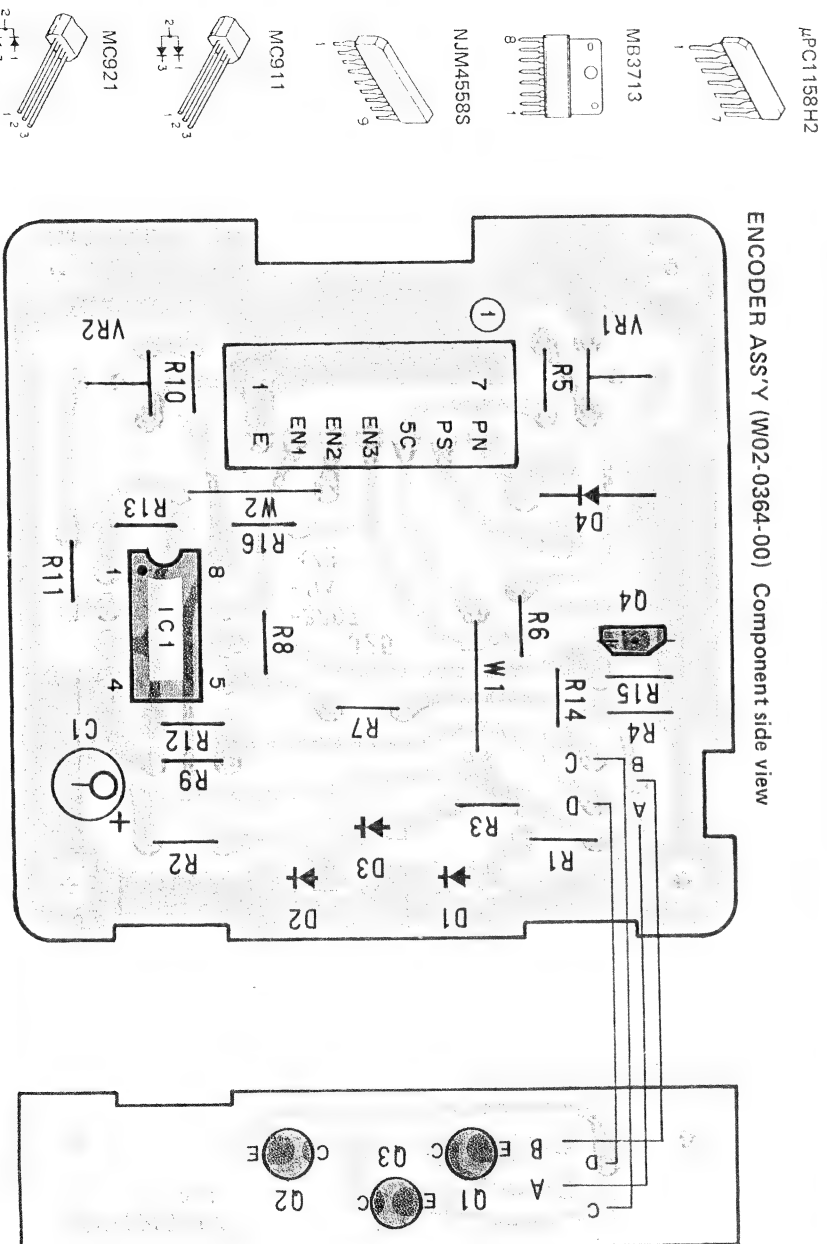
# PC BOARD VIEWS TS-711/811

AF UNIT (X49-1180-00) Component side view

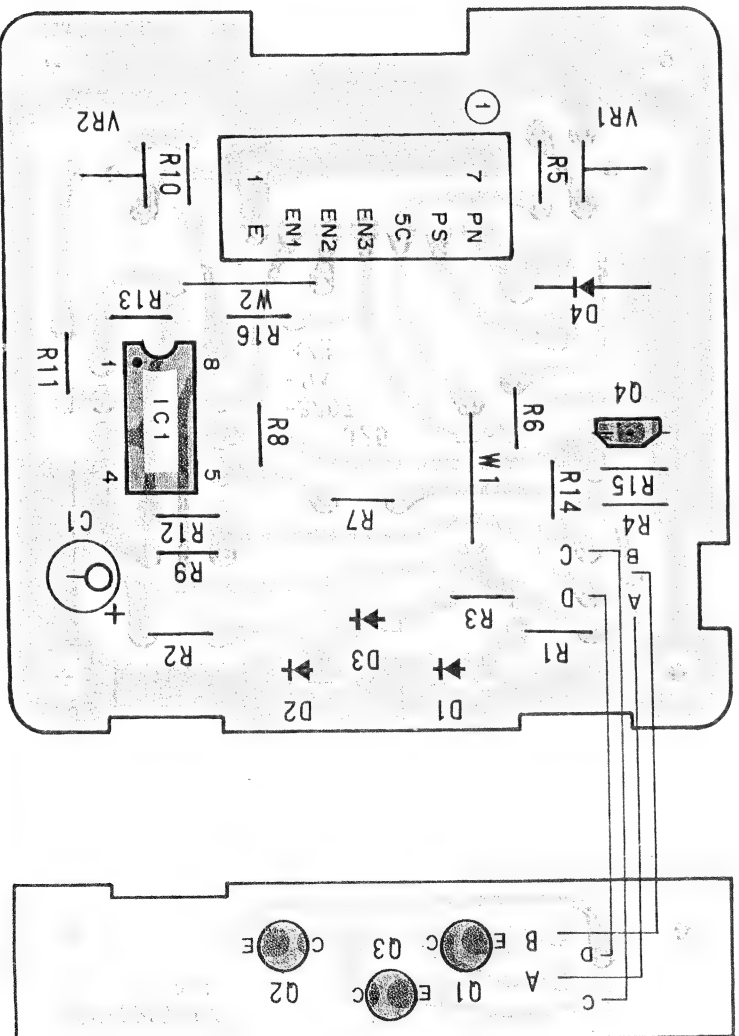
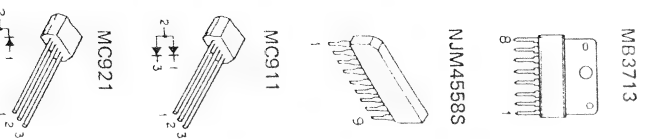


Q1 : 2SC2459(GR) Q2,13 : 2SA1048(Y) Q3,7,8,10,12,14-16 : 2SC2458(Y)  
 Q4,9 : NJM4558S Q5 :  $\mu$ PC1158H2 Q6 : 2SK30A(GR) Q11 : MB3713  
 D1,3,4,6,7,9,10 : 1SS133 D2,8 : MC911 D5 : 1N60 D11 : MC921

ENCODER ASS'Y (W02-0364-00) Component side view



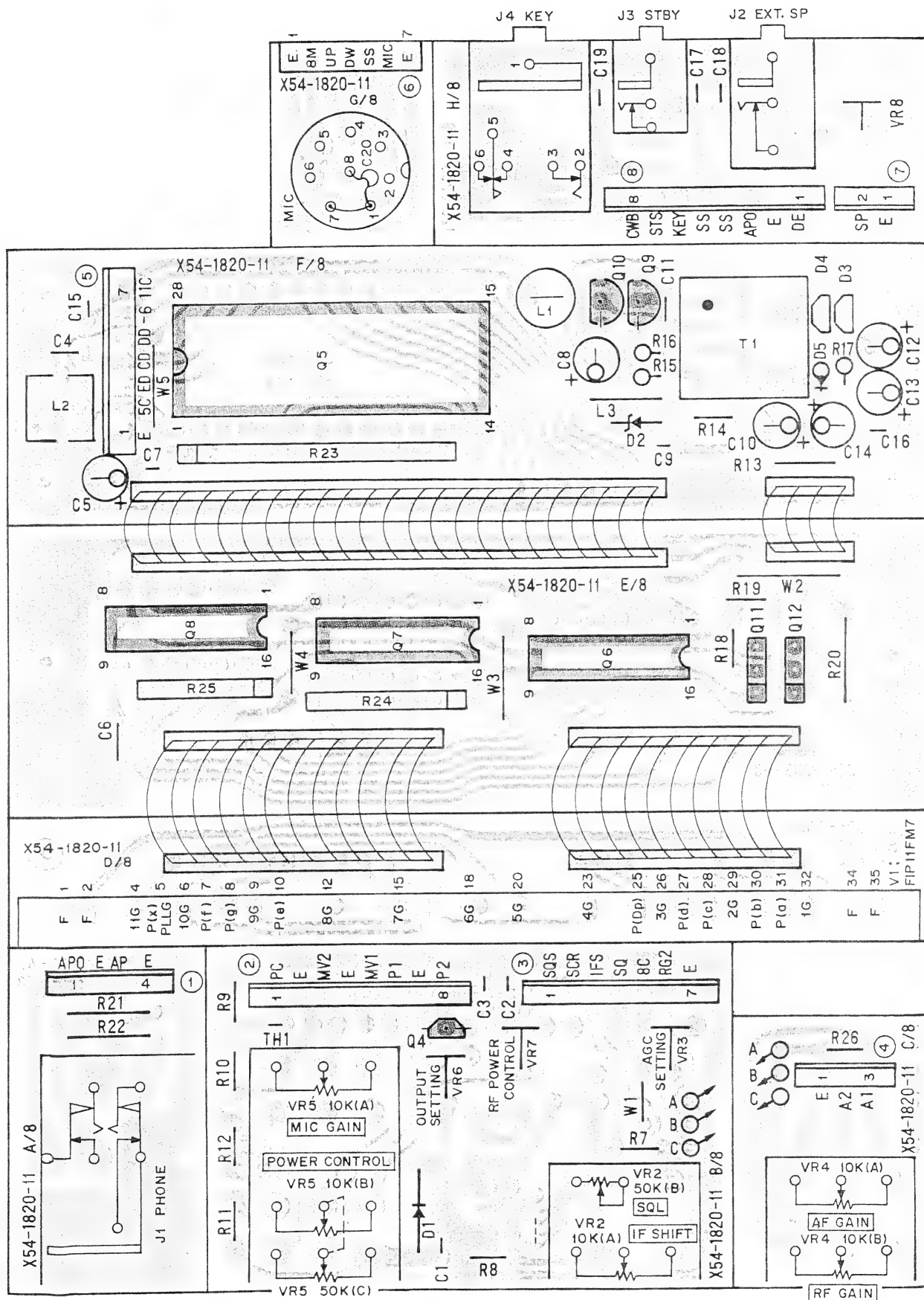
Q1-3 : PN126S(R) Q4 : 2SC2458(Y)  
 IC1 : LM358P  
 D1-3 : LN66(R) D4 : V06B





# TS-711/811 PC BOARD VIEW

DISPLAY UNIT (X54-1820-11) Component side view



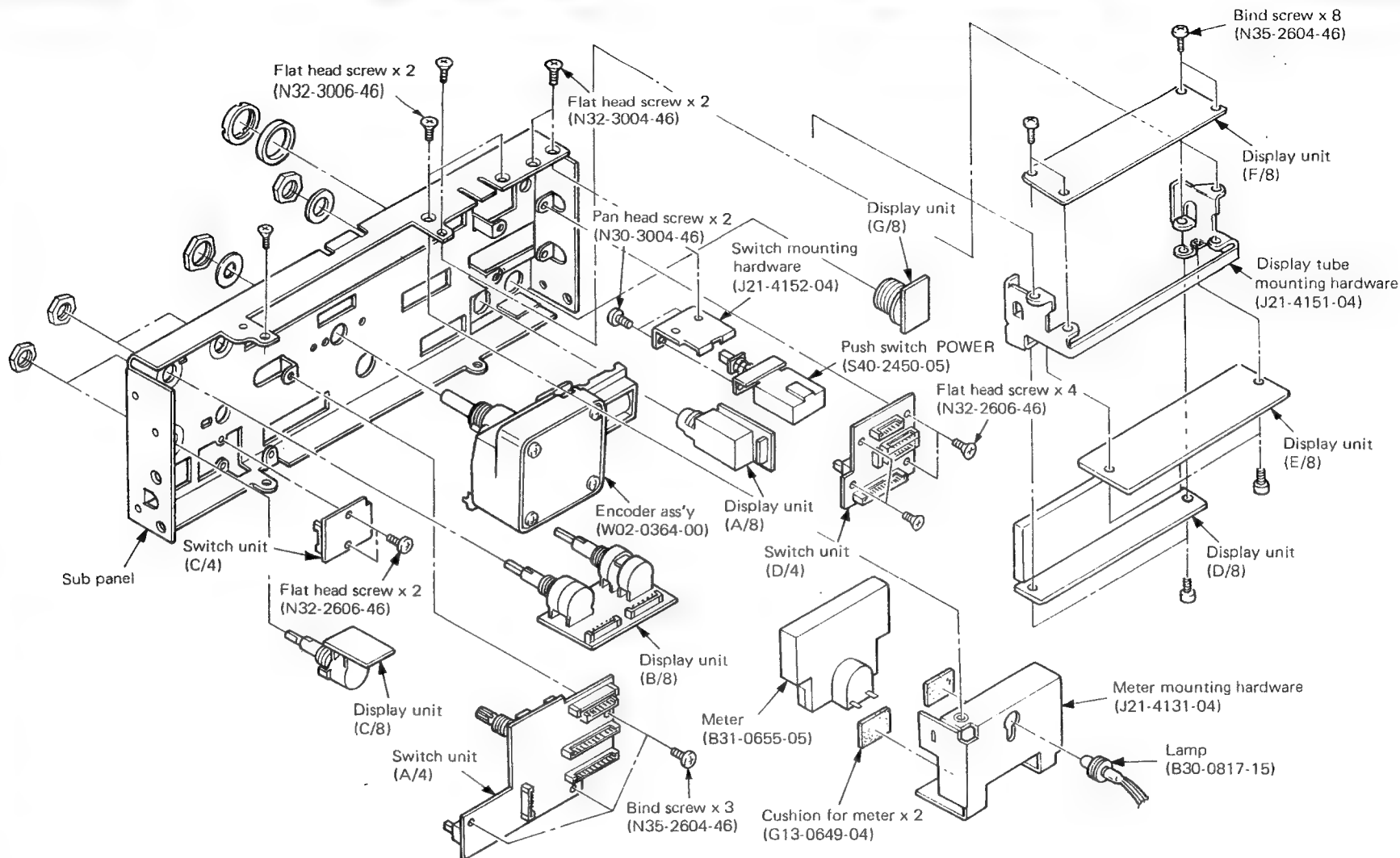
Q4 : 2SC2458(Y) Q5 :  $\mu$ PD763C Q6 :  $\mu$ PA80C Q7,8 : TC5066BP Q9,10 : 2SC1959(Y) Q11,12 : DTA124(F)  
D1 : 1N60 D2 : MTZ6.2JA D3,4 : MC931 D5 : MTZ7.5JA TH1 : 112-351-2

A	B	C	D	E	F

1



# TS-711/811 DISASSEMBLY

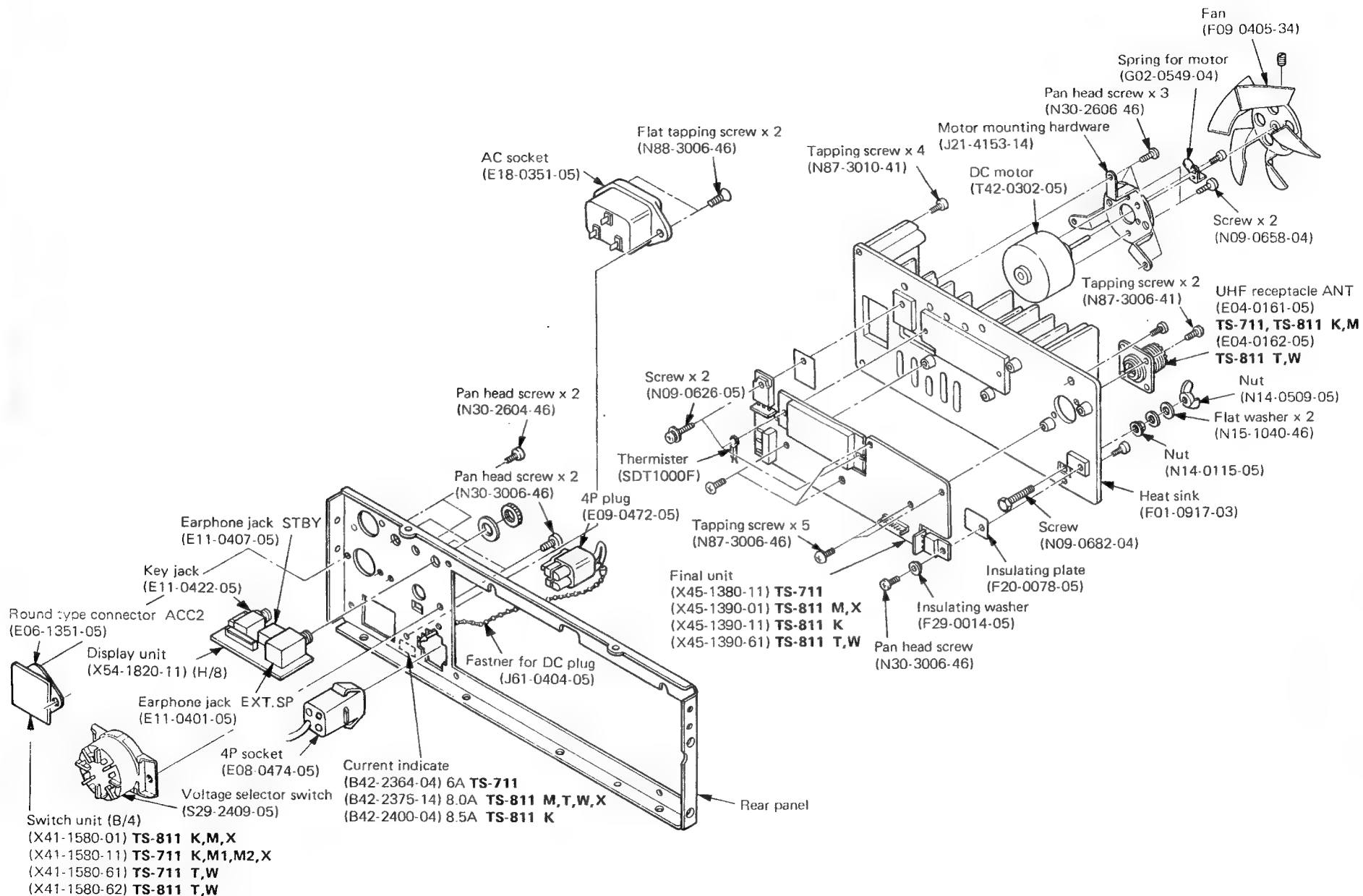


SWITCH UNIT (X41-1580-XX) (-01 : TS-811 K,M,X -11 : TS-711 K,M1,M2,X -61 : TS-711 T,W -62 : TS-811 T,W)

(A/4)			
S1,2	(S50-1412-05)	Tact switch	RIT,CLEAR
S3	(S40-2440-15)	Push switch	NB
S4	(S40-2441-15)	Push switch	VOICE
-	(W02-0365-05)	Rotary encoder	RIT
(C/4)			
S5,6	(S50-2402-05)	Tact switch	MHz (UP,DOWN)
(D/4)			
S7,9	(S50-1412-05)	Tact switch	OFFSET,TONE
S8	(S50-1412-05)	Tact switch	SELECTOR <b>K,M,X</b>
S10	(S40-2440-15)	Push switch	RF ATT ( <b>TS-711</b> ),ACC ( <b>TS-811</b> )
S11,12	(S40-2440-15)	Push switch	RF/ALC,PROC.

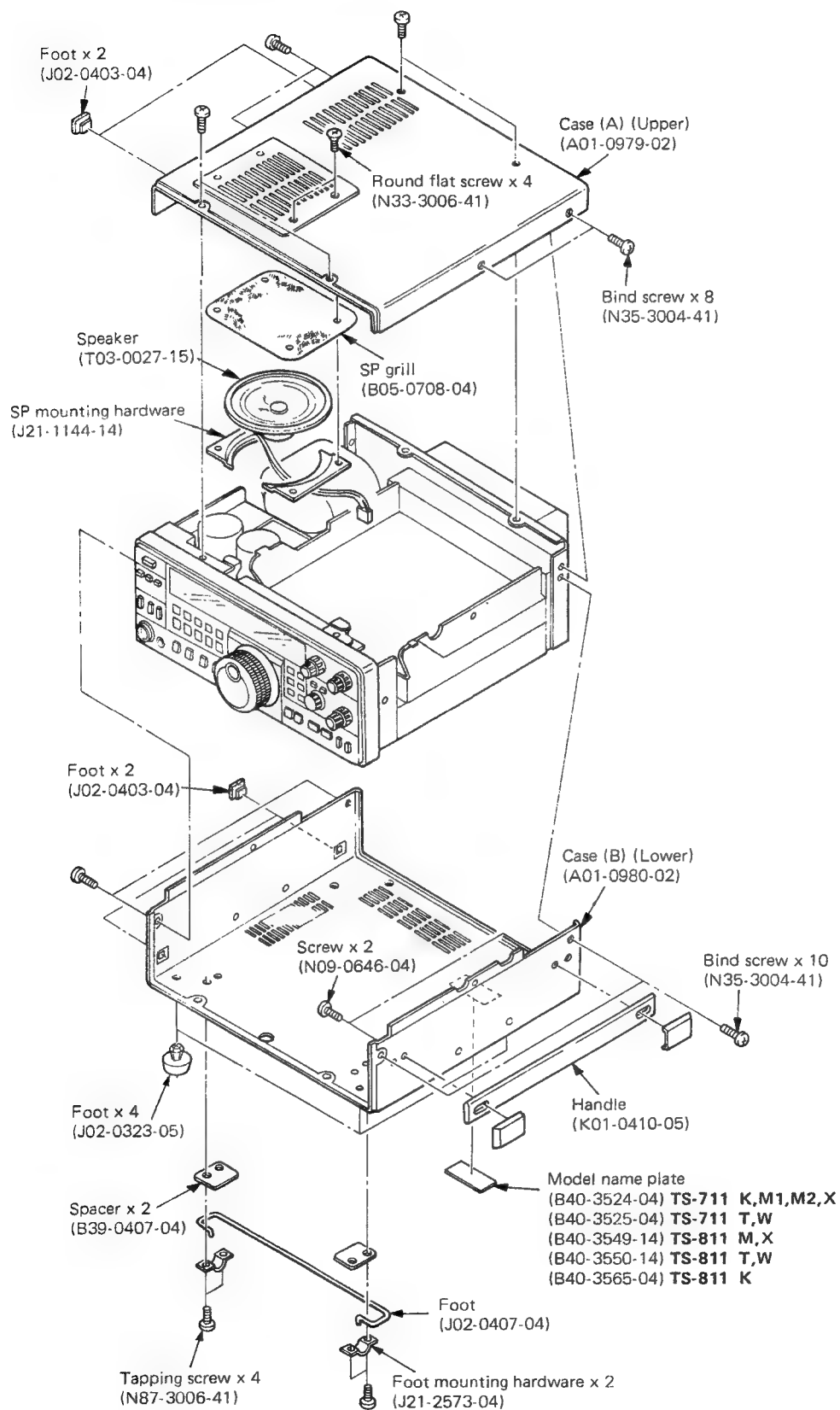
DISPLAY UNIT (X54-1820-11)

(A/8)			
J1	(E11-0413-05)	Phone jack	PHONES
(B/8)			
VR2	(R19-9409-05)	Potentiometer	SQL/IF SHIFT
VR5	(R24-9409-05)	Potentiometer	MIC/RF PWR
(C/8)			
VR4	(R19-3420-05)	Potentiometer	AF/RF
(D/8)			
V1	(F1P11FM7)	Display tube	-
(G/8)			
-	(E06-0858-05)	8P metal socket	MIC

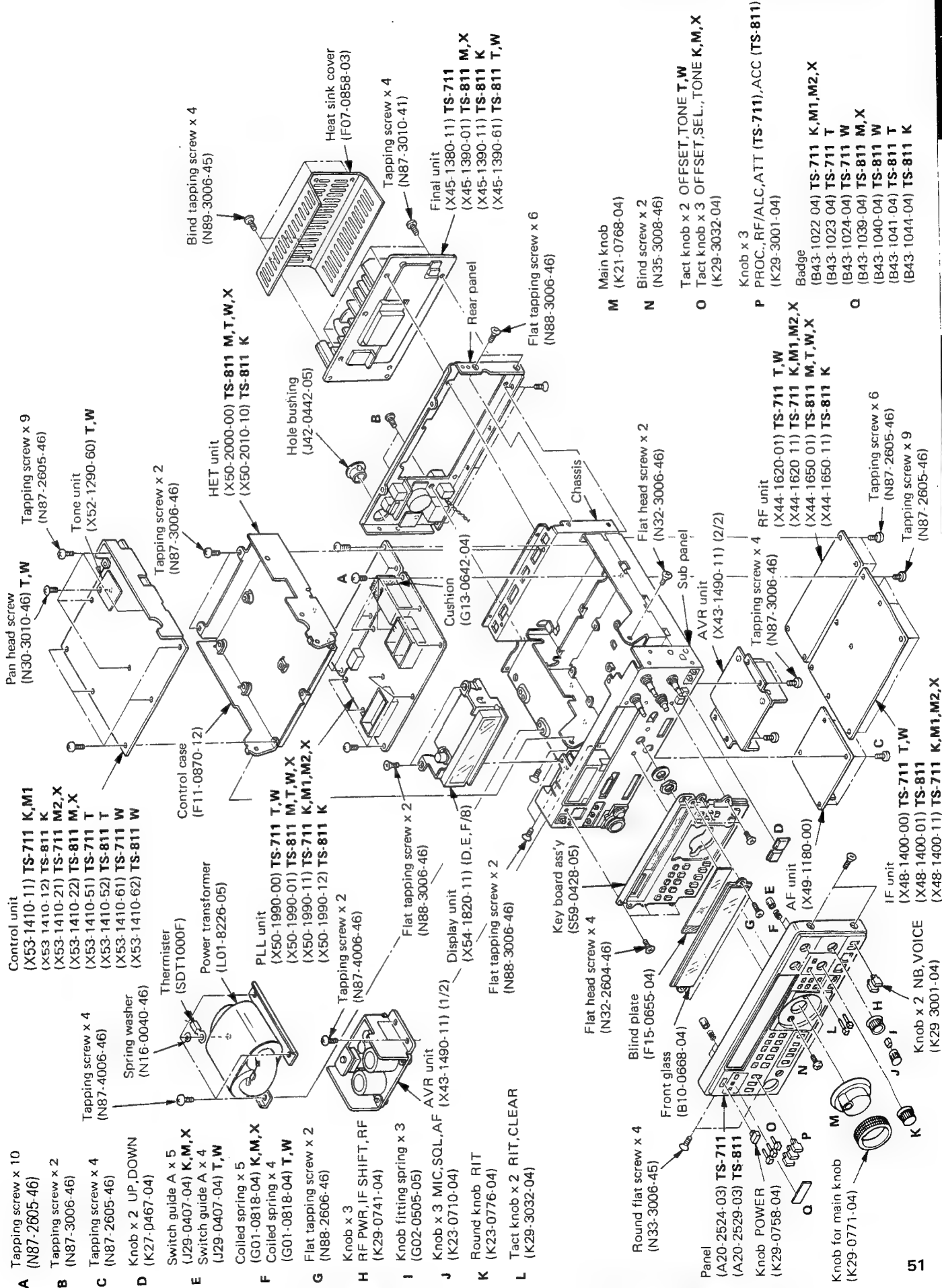


DISASSEMBLY TS-711/811

# TS-711/811 DISASSEMBLY



# DISASSEMBLY TS-711/811



## ADJUSTMENT

## REQUIRED TEST EQUIPMENT

1. **DC V.M**
  - 1) High input impedance
2. **RF VTVM (RF V.M)**
  - 1) Input impedance :  $1M\Omega$  min.,  $2pF$  max.
  - 2) Voltage range : F.S =  $10mV \sim 300V$
  - 3) Frequency range : Up to 450MHz
3. **Frequency Counter (f. counter)**
  - 1) Input sensitivity : Approx.  $50mV$
  - 2) Frequency range : Up to 450MHz
4. **DC Power Supply**
  - 1) Voltage :  $10V \sim 17V$ , variable
  - 2) Current :  $6A$  min.
5. **Power Meter**
  - 1) Measurement range Approx. :  $30W, 3W, 1W$
  - 2) Input impedance :  $50\Omega$
  - 3) Frequency range : 450MHz
6. **AF VTVM (AF V.M)**
  - 1) Input impedance :  $1M\Omega$  min.
  - 2) Voltage range : F.S =  $1mV \sim 30V$
  - 3) Frequency range :  $50Hz \sim 10kHz$
7. **AF Generator (AG)**
  - 1) Output frequency :  $100Hz \sim 10kHz$
  - 2) Output voltage :  $0.5mV \sim 1V$
8. **Linear Detector**
  - 1) Frequency range : 450MHz
9. **Field Strength Meter**
  - 1) Frequency range : 450MHz
10. **Directional Coupler**
11. **Oscilloscope**
  - 1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
  - 1) Frequency range : 144MHz and 430MHz bands
  - 2) Modulation : AM and FM MOD.
  - 3) Output level :  $-20dB$  to  $100dB$
13. **Dummy Load**
  - 1)  $8\Omega, 30W$  (approx.)
14. **Noise Generator**
  - 1) Must generate ignition-like noise containing harmonics beyond 450MHz.
15. **Sweep Generator**
  - 1) Sweep range : 1440MHz and 430MHz bands
16. **Tracking generator**

## PREPARATION

- 1) Unless otherwise specified, knobs and switches should be set as follows **Table 11**.

POWER SW	ON	RF POWER	MAX
PROC. SW	OFF	SQUELCH VR	MIN
ALC/RF SW	RF	AF GAIN VR	MIN
ATT SW TS-711A/E	OFF	RF GAIN VR	MAX
ACC SW TS-811A/B/E	OFF	MIC GAIN VR	MIN
SELECT SW K,M,X	OFF	TONE SW	OFF
TONE SW	OFF	MODE SW	FM
IF SHIFT VR	CENTER		

Table 11

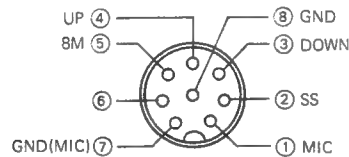


Fig. 17 MIC terminals (view from front panel side)

- 2) Use an insulated adjusting rod to adjust trimmers and coils.
- 3) To prevent damaging SSG, never set the stand by switch to SEND while adjusting the receiver section.
- 4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
- 5) SSG output levels are those at the time the output terminal is open.
- 6) Meter and display section should be set as follows **Fig. 18 or 19**.

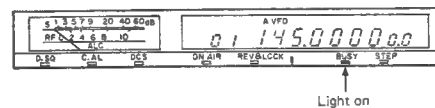


Fig. 18 Meter and display section (TS-711A/E)



Fig. 19 Meter and display section (TS-811A/B/E)

## TS-711 ADJUSTMENT

## TS-711A/E TX/RX Section (Common)

CW : Clockwise, CCW : Counterclockwise

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reset	1) Set the power SW on, while depressing the A=B key. Then release the A=B key.							VFO A 144.000 MODE : CW The "Beeper" sounds
2. Voltage adjustment (1)	1) Connect the AC power cable to the power terminal on the rear panel.							
13.8V, 9V AVR	2) POWER SW : ON	DVM	AVR	D4	AVR	VR1	13.8V	$\pm 0.1V$
(2) AGC voltage	1) RF GAIN : MAX	DVM	DISP (B/B)	RG2	DISP (B/B)	VR3	4.0V	$\pm 0.1V$
(3) RF OUTPUT voltage	1) RF POWER : MIN STBY : SEND	DVM	IF	W28 (Jumper wire)	DISP (B/B)	VR7	2.0V	$\pm 0.05V$
	2) RF POWER : MAX STBY : SEND						3.4V	$\pm 0.2V$
3. PLL	1) SF level adjustment MODE SW : FM FREQ. : 145.0000	RF V.M	PLL	SF (③-1)	PLL	L44	Adjust the core for the MAX reading, then turn it outward until a reading of 0.4V is obtained.	$0.4V \pm 0.01V$
	2) 20.48MHz level adjustment MODE SW : FM FREQ. : 145.0000			TP9		L45,46	MAX	$0.4-0.5V$
	3) 4F (40.96MHz) level adjustment MODE SW : FM FREQ. : 145.0000			4F (③-4)		L47,48	MAX	$0.10-0.15V$
	4) 51.2MHz level adjustment MODE SW : FM FREQ. : 145.0000			TP8		L39,40	MAX	$0.10-0.15V$
	5) B loop VCO adjustment MODE SW : FM FREQ. : 145.0000	DC V.M		TP7		L33	5.5V	$\pm 0.1V$
	6) 11.025MHz level adjustment MODE SW : FM FREQ. : 145.010	RF V.M		TP4		L9	MAX	$0.15-0.18V$
	7) 31.505MHz level adjustment MODE SW : FM FREQ. : 145.010			TP3		L5-7	Adjust the L5 and L7 for the MAX reading repeatedly.	$0.1-0.15V$
	8) A loop VCO adjustment MODE SW : FM FREQ. : 144.0000	DC V.M		TP6		TC2	6.3V T,W 5.1V K,M1,M2,X	$\pm 0.1V$
	145.9999 T,W 148.0000 K,M1,M2,X							$5.2-6.0V$ $1.8-3.8V$
4. PLL output	1) MODE SW : FM FREQ. : 145.9999 T,W 146.0000 K,M1,M2,X	RF V.M	PLL	TP2 TP1	PLL	L4 TC1	MAX	$0.14-0.15V$ $0.46-0.58V$
5. CAR	1) MODE SW : USB IF SHIFT VR : Center	RF V.M	PLL	TP5	PLL	L13	Turn the core outward until a reading of 0.3V is obtained. Confirm the peak point.	$0.3 \pm 0.01V$
	MODE SW : LSB						Confirm	$0.3 \pm 0.02V$
	MODE SW : FM							$0.3 \pm 0.03V$
	2) MODE SW : USB				PLL	TC3	10.69650M $\pm$ z	$\pm 100Hz$
	: LSB					TC4	10.69350M $\pm$ z	$\pm 100Hz$



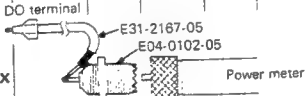
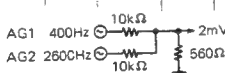
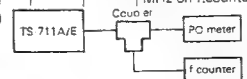
## TS-711 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. S-meter (1) (CW, SSB)	2) SSG : 20dBμ Adjust the SSG frequency to the MAX S-meter reading.	SSG AF V.M Oscillo- scope			IF	VR5	"S-9"	Adjust the L14 to MAX, if S-meter does not read the "S-3".
	3) SSG : 0dBμ					L14	Adjust the L14 CCW to the "S-3" reading.	
	4) SSG : 20dBμ					VR5	"S-9"	
6. S-meter (2) (FM)	1) MODE SW : FM VFO : 145.0000 SSG : 36dBμ SSG MOD : 1kHz SSG DEV : 5kHz	SSG AF V.M Oscillo- scope			IF	VR9	"S-10"	
7. Carrier balance	1) MODE SW : USB RF GAIN : MIN (After confirm RF GAIN : MAX)	RF V.M	IF	TP3	IF	TC2	Adjust to the dip point.	
8. NB	1) MODE SW : CW VFO : 145.0000 SSG : 10dBμ	DC V.M	IF	TP4	IF	L25,27	MIN	
9. SSG squelch	1) MODE SW : CW VFO : 145.0000 SSG : 0dBμ SQ VR : MAX Adjust the SSG frequency to MAX AF V.M reading.	SSG Oscillo- scope AF V.M			IF	VR6	Adjust the VR6 slowly and stop at the threshold point.	SQ open : SSG 0-6dB
	2) SSG output : OFF						Adjust the SQ VR to the threshold point.	
	3) SSG : -10dBμ							SQ open
10. SSB/CW S/N	1) MODE SW : LSB VFO : 144.0000 SSG : -10dBμ <b>K,M1,M2,X</b> -12dBμ <b>T,W</b>	SSG AF V.M Oscillo- scope						S/N 10dB or greater
11. FM S/N	1) MODE SW : FM SSG : -7dBμ <b>K,M1,M2,X</b> -8dBμ <b>T,W</b> VFO : 144.0000 145.0000 <b>T,W</b> 145.9999 144.0000 146.0000 <b>K,M1,M2,X</b> 148.0000	SSG AF V.M Oscillo- scope						20dB or greater

## TS-711 A/E TX Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method.	
1. Setting	1) Disconnect the coax. cable from the TIF terminal in the IF unit.							
2. IF output	1) RF POWER : MAX MODE SW : CW STBY : SEND IF unit VR7 : Center	RF V.M	IF	TP1	IF	L6— 11,18	Adjust the each coil for the MAX RF V.M reading repeatedly.	(0.3—0.4V)
3. CW CAR level	1) MODE SW : CW STBY : SEND  Connect the coax. cable to the TIF terminal after adjust.	RF V.M	IF	D18	IF	L8	MAX	0.3V or less
				TP1		VR7	0.38V	±0.01V

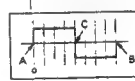
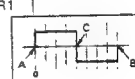
## TS-711 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks						
		Test equipment	Unit	Terminal	Unit	Part	Method							
4. Drive output	1) Disconnect the coax. cable from the D0 terminal in the RF unit. Then connect the 1W power meter MODE SW : CW STBY : SEND VFO : 145.0000 T,W : 146.0000 K,M1,M2,X	0.6W Power-meter	RF	D0	RF	L10, 14-17, TC1.2	Adjust the each coil for the MAX output repeatedly. Connect the coax. cable to the D0 terminal after adjust. (adjust the L15 from peak to center position of coil)	0.25W or greater						
														
5. Output power	1) MODE SW : CW STBY : SEND VFO : 145.0000 T,W : 146.0000 K,M1,M2,X	Power-meter (30W or 50W)			IF	VR1	Adjust to the mechanical center.	38W or greater						
6. ALC meter	1) POWER CONTROL : MAX MIC GAIN VR : MIN MODE SW : USB ALC/RF SW : ALC FREQ. : 145.000 STBY : SEND	ALC meter			DISP (B/B)	VR6	26W	±1W						
					IF	VR2	Adjust to the mechanical zero point.	RF meter "B"						
	2) MODE SW : CW STBY : SEND	RF	TC2	Adjust for the MAX ALC meter reading.										
		IF	VR3	RF "B"										
7. RF meter	1) MODE SW : CW FREQ. : 145.000 ALC/RF SW : RF	RF meter			Final	VR1	RF "B"	RF meter "B"						
8. Protection	1) MODE SW : CW	DC V.M	IF	PRO (12-5)	Final	VR2	MIN							
	2) Connect the ANT terminal to GND.	DC A.M			IF	VR1	3.5A	±0.1A						
9. Carrier suppression	1) MODE SW : USB, LSB MIC GAIN : MIN POWER CONTROL : MAX	RF V.M Power-meter Oscilloscope			IF	VR8 TC3	MIN or USB and LSB.	50dB or more						
10. SSB frequency response	1) MODE SW : USB, LSB MIC GAIN : Center AG output : Two-tone 2mV, 400Hz, 2600Hz STBY : SEND MIC GAIN VR : 25W	Power-meter (30 or 50W) Oscilloscope			PLL	TC3 (USB) TC4 (LSB)		Adjust to within -9dB level at the 400Hz and the 2.6kHz from the 1.5kHz <b>Note :</b> Confirm the carrier suppression after this adjustment.						
														
	2) AG output : Single tone 2mV, 1.5kHz MIC GAIN VR : 25W							Adjust for the equal output power at 400Hz, 2600Hz as measured on watt-meter.						
							3) MODE SW : CW STBY : SEND	f.counter	PLL	TP5	PLL	VR2	10.69570MHz	±10Hz
							4) MODE SW : FM					VR3	10.6950MHz	±10Hz
11. FM FREQ.	1) Front pane. CH.O : ON DISPLAY : 145.000 MODE SW : FM STBY : SEND	Power-meter f.counter	DISP (D/B)	Display tube (V1)	IF	TC1	Adjust to 145.000 MHz on f.counter.	±10Hz						
														

## TS-711 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
12. Deviation	1) PROC : OFF MODE SW : FM FREQ. : 145.000 STBY : SEND AG output : 1kHz, 20mV (30mV K)	AG Linear detector		ANT (Directional coupler)	AF	VR3	4.8kHz	±0.1kHz
	2) AG output : 1kHz, 2mV (3mV K)					VR2	3kHz	±0.1kHz
13. Speech processor	1) PROC : ON MODE SW : FM FREQ. : 145.000 STBY : SEND AG output : 1kHz, 20mV (30mV K)	AG Linear detector			AF	VR2	4.1kHz	±0.1kHz
	2) PROC : OFF							
14. SSB MIC sensitivity	1) MODE SW : USB MIC GAIN VR : Center AG output : 1kHz, 3mV	AG Power-meter					Confirm	15W or greater
15. CW sidetone breakin	1) MODE SW : CW AF GAIN VR : Center Connect KEY to KEY jack.	AF V.M Oscilloscope			AF	VR4	Key down 0.63V	±0.1V Confirm sidetone output.
					Rear panel	VR8	Turn the VR8 and check breakin function.	Delay time : VR8 MIN : Short time MAX : longer time
16. Beep tone	1) SQL VR : Center AF GAIN VR : Center M. IN : 1 push	AF V.M Oscilloscope			CONT	VR1	0.4V/P-P	±0.1V Confirm tone output.
17. TONE (T)	1) MODE SW : FM TONE SW : ON STBY : SEND	Linear detector f. counter			TONE	VR1	Shorted wire between "TH" and "SC" on TONE unit. 1750Hz	DEV : ±2.5kHz ±5kHz
18. TONE (W)	1) MODE SW : FM TONE SW : push (hold)				TONE	VR1	1750Hz	DEV : ±2.5kHz ±5kHz

## TS-711 A/E ENCODER Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Encoder	1) Remove the VFO knob and motor-drive the encoder at approx. 300rpm. 2) EN1 duty ratio adjustment : Turn both CW and CCW CW : Clockwise CCW : Counter clockwise 3) EN2 duty ratio adjustment : Turn in the both directions.	Oscilloscope	CONT	EN3 (2-4)				Point C may be located anywhere. When a motor is not available, manually turn the VFO to check the duty ratio.
					Encoder	VR1		After adjusting with the VFO control turned CW, check that intervals D and E are also identical when the VFO control is turned CCW.
						VR2	Adjust until intervals D and E are equal to each other with point C placed at the center.	

TOP VIEW



**BOTTOM VIEW**



## TS-811 ADJUSTMENT

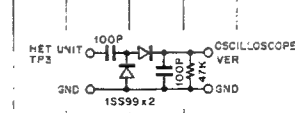
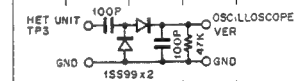
## TS-811A/B/E TX/RX Section (Common)

CW : Clockwise, CCW : Counterclockwise

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reset	1) Set the power SW on, while depressing the A=B key. Then release the A=B key.							VFO A 433.000 MODE : CW The "Beeper" sounds
2. Voltage adjustment (1)	1) Connect the AC power cable to the power terminal on the rear panel.							
13.8V, 9V AVR	2) POWER SW : ON	DVM	AVR	D4	AVR	VR1	13.8V	±0.1V
(2) AGC voltage	1) RF GAIN : MAX	DVM	DISP (B/B)	RG2	DISP (B/B)	VR3	4.0V	±0.1V
(3) RF OUTPUT voltage	1) RF POWER : MIN STBY : SEND	DVM	IF	W28 (Jumper wire)	DISP (B/B)	VR7	2.0V	±0.05V
	2) RF POWER : MAX STBY : SEND						3.4V	±0.2V
3. PLL	1) SF level adjustment MODE SW : FM FREQ. : 435.0000	RF V.M	PLL	SF (③-1)	PLL	L44	Adjust the core for the MAX reading, then turn it outward until a reading of 0.4V is obtained.	0.4V±0.01V
	2) 20.48MHz level adjustment MODE SW : FM FREQ. : 435.0000			TP9		L45,46	MAX	0.4—0.5V
	3) 4F (40.96MHz) level adjustment MODE SW : FM FREQ. : 435.0000			4F (③-4)		L47,48	MAX	0.10—0.15V
	4) 51.2MHz level adjustment MODE SW : FM FREQ. : 435.0000			TP8		L39,40	MAX	0.10—0.15V
	5) B loop VCO adjustment MODE SW : FM FREQ. : 430.0000 : 439.9999	DC V.M		TP7		L33	5.5V	±0.1V 2.0—3.5V
	6) 11.025MHz level adjustment MODE SW : FM FREQ. : 435.010	RF V.M		TP4		L9	MAX	0.15—0.18V
	7) 31.505MHz level adjustment MODE SW : FM FREQ. : 435.010			TP3		L5—7	Adjust the L5 and L7 for the MAX reading repeatedly.	0.1—0.15V
	8) A loop VCO adjustment MODE SW : FM FREQ. : : 430.0000 : 439.9999	DC V.M		TP6		TC2	6.5V	±0.1V 0.9—2.0V
4. PLL output	1) MODE SW : FM FREQ. : 435.0000	RF V.M	PLL	TP2	PLL	L4	MAX	0.14—0.15V
			HET	TP1		TC1	MAX	0.2V or greater
5. CAR	1) MODE SW : USB (CAR level) IF SHIFT VR : Center	RF V.M	PLL	TP5	PLL	L13	Turn the core outward until a reading of 0.3V is obtained. Confirm the peak point.	0.3±0.01V
	MODE SW : LSB						Confirm	0.3±0.02V
	MODE SW : FM							0.3±0.03V
	2) MODE SW : USB				PLL	TC3	10.69550MHz	±100Hz
	: LSB					TC4	10.03300MHz	±100Hz

## TS-811 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. CAR	3) MODE SW : LSB (SEND) : CW : FM	f.counter	PLL	TP5	PLL	VR1	10.69350MHz	±100Hz
						VR2	10.69570MHz	±100Hz
						VR3	10.69500MHz	±100Hz
6. IF SHIFT check	1) MODE SW : USB (RX) 2) MODE SW : LSB (TX)	f.counter	PLL	TP5			Turn the IF SHIFT all the way CW and CCW.	±1.0kHz or greater Not work on FM mode. Does not change
7. TCXO f. adjustment (Temperature consequence crystal oscillator)	1) MODE SW : USB FREQ. : 439.000	f.counter	HET	TP7	PLL	L41 (TC XO)	286.720000MHz	±30Hz
	2) MODE : USB K FREQ. : 441.000				HET	TC3	296.720000MHz	±30Hz
8. HET K type	1) 40.96MHz level adjustment FREQ. : 439.000	RF V.M	HET	TP4	HET	L8,9	MAX. Repeat 2—3 times.	0.4V or more
	2) 286.72MHz level adjustment			TP6		TC2 L10,11	MAX. Repeat 2—3 times. Then, adjust the TC2 for the MAX again.	
	3) 42.38857MHz level adjustment FREQ. : 441.000 IF unit TC3 : Center			TP7		L18,19	MAX. Repeat 2—3 times.	0.4V or more
	4) 296.72MHz level adjustment FREQ. : 439.000 : 441.000			TP6		L20,21		
	5) Helical adjustment Disconnect the coax. cable from the HET terminal in the PLL unit. Connect the sweep G. (OUT : 25dB) to TP2 in the HET unit, connect the detector to TP3 in the HET unit. HET unit TC1 : MAX After adjustment, connect the coax. cable to the HET terminal in the PLL unit.	Sweep G. Oscilloscope Detector		TP3		L4,5	Adjust the L4 and L2 as waveform as shown on right.	0.3V or more
9. HET M,T,W,X type	1) 40.96MHz level adjustment	RF V.M	HET	TP5	HET	L8,9	MAX. Repeat 2—3 times.	0.4V or more
	2) 286.72MHz level adjustment			TP7		TC2—4, L10	Adjust the TC4, TC2, and TC3. Repeat 2—3 times. Also adjust the TC2,3 again.	0.3V or more
	3) Helical adjustment Disconnect the coax. cable from the HET terminal in the PLL unit. Connect the Sweep G. (OUT : 25dB) to TP2 in the HET unit, connect the detector to TP3 in the HET unit. HET unit TC1 : MAX After adjustment, connect the coax. cable to the HET terminal in the PLL unit.	Sweep G. Oscilloscope Detector		TP3		L4,5	Adjust the L4 and L2 as waveform as shown on right.	



TS-811 ADJUSTMENT

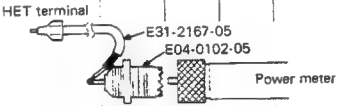
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
6. S-meter (2) (FM)	1) MODE SW : FM VFO : 435.0000 SSG : 30dBμ SSG MOD : 1kHz SSG DEV : 5kHz	SSG AF V.M Oscillo- scope			IF	VR9	"S-10"  1 3 5 7 9 20 40 60 0 2 4 6 8 10 ADJ	
7. Carrier balance	1) MODE SW : USB RF GAIN : MIN (After confirm RF GAIN : MAX)	RF V.M	IF	TP3	IF	TC2	Adjust to the dip point.	
8. NB	1) MODE SW : CW VFO : 435.0000 SSG : 10dBμ	DC V.M	IF	TP4	IF	L25,27	MIN	
9. SSG squelch	1) MODE SW : CW VFO : 435.0000 SSG : 0dBμ SQ VR : MAX Adjust the SSG frequency to MAX AF V.M reading. 2) SSG output : OFF 3) SSG : -12dBμ	SSG Oscillo- scope AF V.M			IF	VR6	Adjust the VR6 slowly and stop at the threshold point.  Adjust the SQ VR to the threshold point.	SQ open : SSG 0-6dB  SQ open
10. SSB/CW S/N	1) MODE SW : LSB VFO : 430.0000 SSG : -10dBμ K,M,X -12dBμ T,W	SSG AF V.M Oscillo- scope						S/N 10dB or greater
11. FM S/N	1) MODE SW : FM SSG : -7dBμ K,M,X -8dBμ T,W VFO : 430.0000 435.0000 T,W 439.0000 430.0000 K,M,X 449.9999	SSG AF V.M Oscillo- scope						20dB or greater

TS-811A/B/E TX Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Setting	1) Disconnect the coax. cable from the TIF terminal in the IF unit.							430 450 K
2. Helical	1) Connect the sweep G. (OUT : 20dB) to TP1. RF unit TC1 : MAX  Disconnect the coax. cable from the HET terminal.	Sweep G. Oscillo- scope Detector	RF	TP2		L5-7		430 440 M,T,W,X NG GOOD
3. IF output	1) RF POWER : MAX MODE SW : CW STBY : SEND IF unit VR7 : Center	RF V.M	IF	TP1	IF	L6-11,18	Adjust the each coil for the MAX RF V.M reading repeatedly.	(0.3-0.4V)
4. CW CAR level	1) MODE SW : CW STBY : SEND Connect the coax. cable to the TIF terminal after adjust.	RF V.M	IF	D18 TP1	IF	L8 VR7	MAX 0.38V	0.3V or less ±0.01V

TS-811 ADJUSTMENT

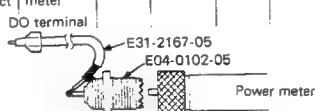
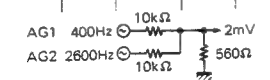
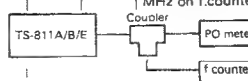
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
10. HET	1) PLL VCO OUT level adjustment FREQ. : 435.000  2) HET OUT level adjustment Disconnect the coax. cable from the HET terminal in the HET unit. Connect the power meter to the HET terminal in the HET unit. (HET OUT terminal are connected 50Ω dummy.)	RF V.M	HET	TP1	PLL	TC1	MAX	0.3V or more
				TP4	HET	TC1	MAX	(0.1-0.2V)



TS-811A/B/E RX Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Helical	1) MODE SW : FM Connect the Sweep G. to the ANT terminal	Sweep G. Oscillo- scope Detector	RF	TP4	RF	L13,14	Adjust the L13 and L14 as waveform as shown on right.	M,X,T,W K 430 440 450
2. 4F level adjustment (40.96MHz)	1) MODE SW : FM RX	RF V.M	IF	D1 (cathode)	IF	L1-3	MAX (0.9V)	0.8V or greater
3. IF GAIN (1) (FM MODE)	1) MODE SW : FM VFO : 435.0000 SSG : 10dBμ SSG MOD : 1kHz SSG DEV : 5kHz	SSG Oscillo- scope AF V.M S-meter			RF	L15,17 TC3 L24, 28,29 L33	Adjust the each coil for MAX S-meter reading repeatedly. MAX AF V.M reading.	Maintain the SSG output level to about the "3" S-meter reading.
4. IF GAIN (2) (CW MODE)	1) MODE SW : CW VFO : 435.0000 SSG : -10dBμ VR6 :	SSG Oscillo- scope AF V.M			IF	L23 L13-15, 20-22	Adjust the L23 CCW to the -2dB point from MAX. AF V.M reading. Adjust the L13-15, L20-22, for MAX S-meter reading repeatedly.	Maintain the SSG output level to about the "3" S-meter reading.
	2) MODE SW : FM VFO : 435.0000 SSG : 10dBμ				RF	L15,17	MAX	
	3) MODE SW : CW VCO : 435.0000 SSG : -10dBμ				IF	L23	Adjust the L23 CCW to the -2dB point from MAX AF V.M reading.	
5. S-meter (1) (CW, SSB)	1) MODE SW : CW SSG output : OFF				IF	VR4	Adjust to the "0" S-meter reading on RF meter scale.	
	2) SSG : 20dBμ Adjust the SSG frequency to the MAX S-meter reading.	SSG AF V.M Oscillo- scope				VR5	"S-9"	
	3) SSG : 0dBμ					L14	Adjust the L14 CCW to the "S-3" reading.	Adjust the L14 to MAX, if S-meter does not read the "S-3".
	4) SSG : 20dBμ					VR5	"S-9"	

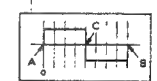
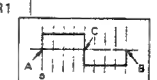
## TS-811 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. Drive output	1) Disconnect the coax. cable from the D0 terminal in the RF unit. Then connect the 1W power meter MODE SW : CW STBY : SEND VFO : 435.000 M,T,W,X : 438.000 K	0.6W Power-meter	RF	D0	RF	TC1,2	Adjust the each coil for the MAX output repeatedly. Connect the coax. cable to the D0 terminal after adjust. (adjust L15 peak to center position of coil)	0.30W or greater
								
6. Output power	1) MODE SW : CW STBY : SEND VFO : 439.9999 M,T,W,X : 449.9999 K	Power-meter (30W or 50W)			IF	VR1	Adjust to the mechanical center.	32W or greater
					DISP (B/8)	VR6	26W (Setting value)	±1W, 7.5A or less
7. ALC meter	1) POWER CONTROL : MAX MIC GAIN VR : MIN MODE SW : USB ALC/RF SW : ALC FREQ. : 145.000 STBY : SEND	ALC meter			IF	VR2	Adjust to the mechanical zero point.	RF meter "8"
	2) MODE SW : CW STBY : SEND				RF	TC2	Adjust for the MAX ALC meter reading.	
					IF	VR3	RF "8"	
8. RF meter	1) MODE SW : CW FREQ. : 435.000 ALC/RF SW : RF	RF meter			Final	VR1	RF "8"	RF meter "8"
9. Protection	1) MODE SW : CW	DC V.M	IF	PRO (12-5)	Final	VR2	MIN	
	2) Connect the ANT terminal to GND.	DC A.M			IF	VR1	4.0A	±0.1A
10. Carrier suppression	1) MODE SW : USB, LSB MIC GAIN : MIN POWER CONTROL : MAX	RF V.M Power-meter Oscilloscope			IF	VR8 TC3	MIN or USB and LSB.	50dB or more
11. SSB frequency response	1) MODE SW : USB, LSB MIC GAIN : Center AG output : Two-tone 2mV, 400Hz, 2600Hz STBY : SEND MIC GAIN VR : 25W	Power-meter (30 or 50W) Oscilloscope			PLL	TC3 (USB) TC4 (LSB)	Adjust to within -9dB level at the 400Hz and the 2.6kHz from the 1.5kHz <b>Note</b> : Confirm the carrier suppression after this adjustment.	
								Adjust to the sharp cross point.
	2) AG output : Single tone 2mV, 1.5kHz MIC GAIN VR : 25W					TC3 (USB) TC4 (LSB)	Adjust for equal output power at 400Hz, 2600Hz as measured on watt-meter.	
	3) MODE SW : CW STBY : SEND	f.counter	PLL	TP5	PLL	VR2	10.69570MHz	±10Hz
	4) MODE SW : FM					VR3	10.6950MHz	±10Hz
12 FM FREQ.	1) Front panel CH.Q. ON DISPLAY : 435.000 MODE SW : FM STBY : SEND	Power-meter f.counter	DISP (D/8)	Display tube (V1)	IF	TC1	Adjust to 145.000 MHz on f.counter.	±10Hz
								

## TS-811 ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
13. Deviation	1) PROC : OFF MODE SW : FM FREQ. : 435.000 STBY : SEND AG output : 1kHz, 20mV (30mV K)	AG Linear detector		ANT (Directional coupler)	AF	VR3	4.6kHz	±0.1kHz
	2) AG output : 1kHz, 2mV (3mV K)					VR2	3kHz	±0.1kHz
14. Speech processor	1) PROC : ON MODE SW : FM FREQ. : 435.000 STBY : SEND AG output : 1kHz, 20mV (30mV K)	AG Linear detector			AF	VR2	4.1kHz	±0.1kHz
	2) PROC : OFF							
15. SSB MIC sensitivity	1) MODE SW : USB MIC GAIN VR : Center AG output : 1kHz, 3mV	AG Power-meter					Confirm	15W or greater
16. CW side tone breakin	1) MODE SW : CW AF GAIN VR : Center Connect KEY to KEY jack.	AF V.M Oscilloscope			AF	VR4	Key down 0.63V	±0.1V Confirm side tone output.
					Rear panel	VR8	Turn the VR8 and check break in function.	Delay time : VR8 MIN : Short time MAX : longer time
17. Bep tone	1) SQL VR : Center AF GAIN VR : Center M. IN : 1 push	AF V.M Oscilloscope			CONT	VR1	0.4V/P-P	±0.1V Confirm tone output.
18. TONE (T)	1) MODE SW : FM TONE SW : ON STBY : SEND	Linear detector f. counter			TONE	VR1	Shorted wire between "TH" and "SC" on TONE unit. 1750Hz	DEV : ±2.5kHz ±5kHz
19. TONE (W)	1) MODE SW : FM TONE SW : push (hold)				TONE	VR1	1750Hz	DEV : ±2.5kHz ±5kHz

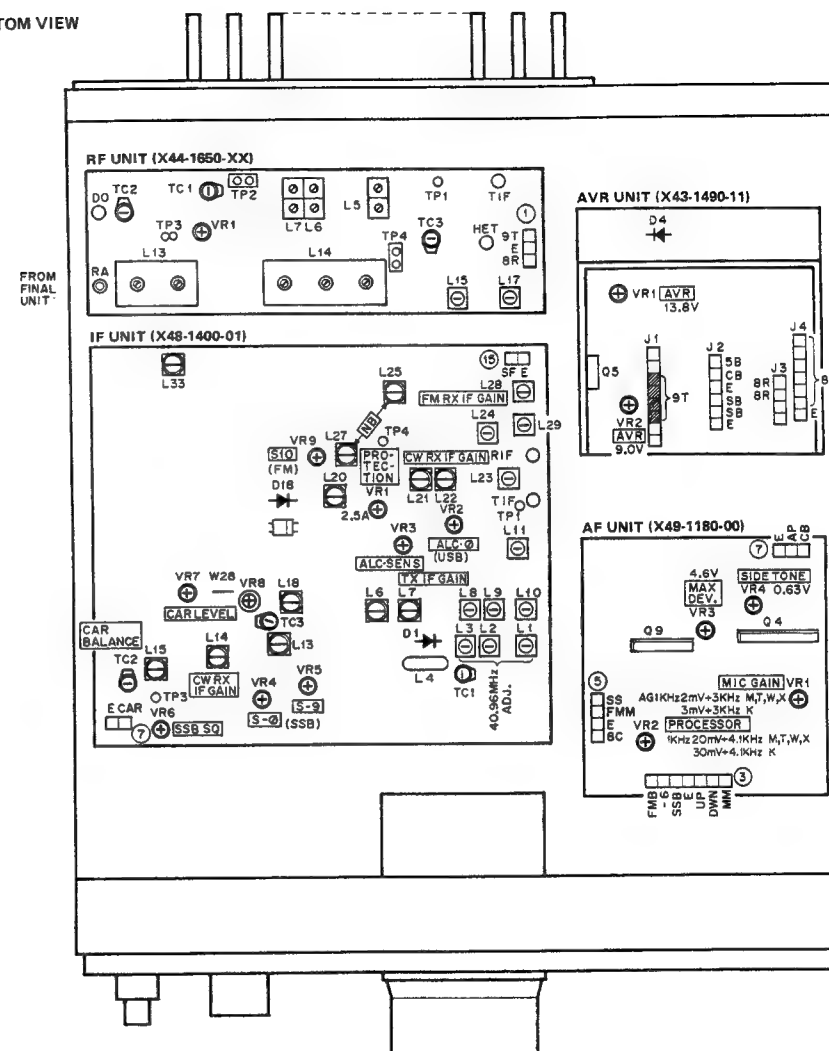
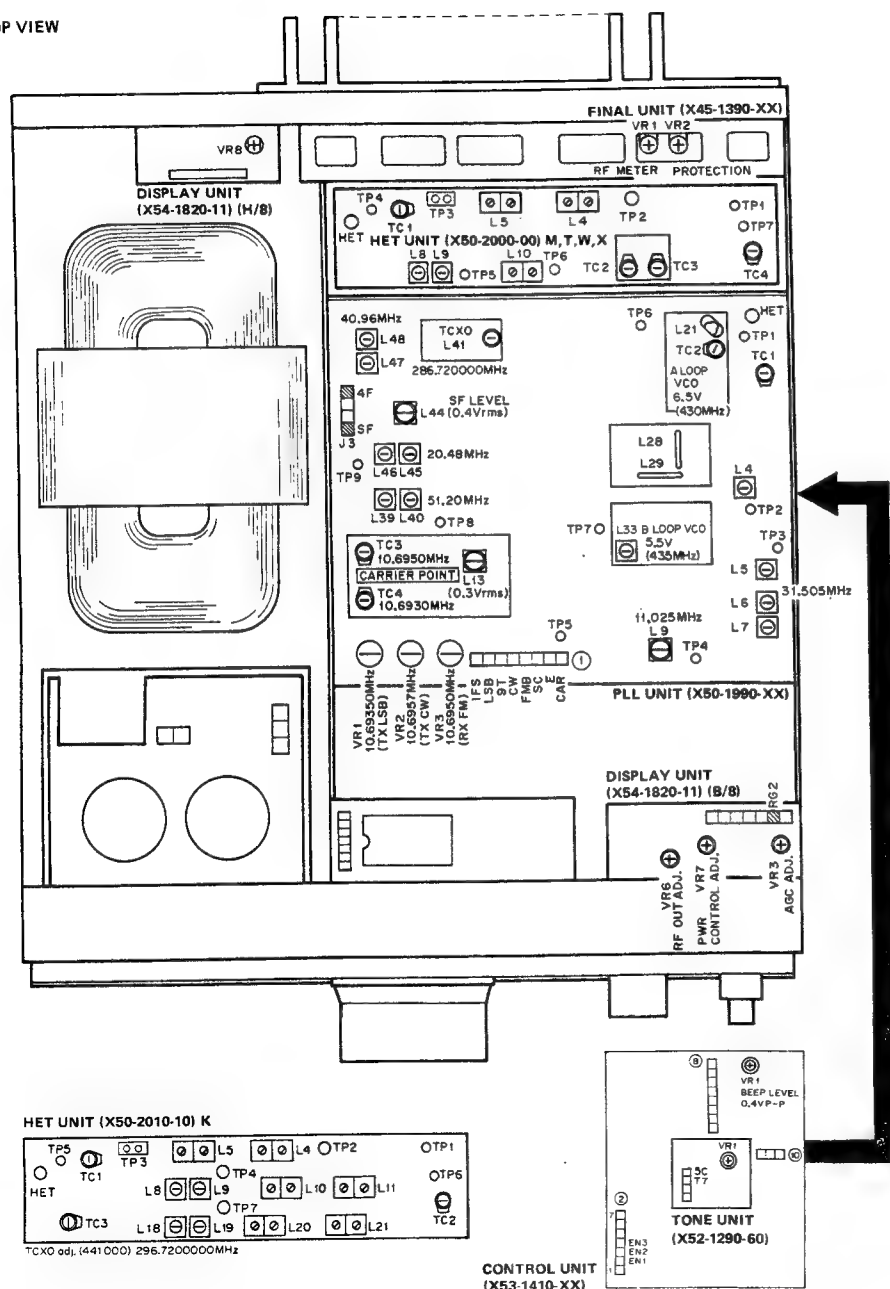
## TS-811A/B/E ENCODER Section

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Encoder	1) Remove the VFO knob and motor-drive the encoder at approx. 300rpm.	Oscilloscope	CONT	EN3 (2-4)				Point C may be located anywhere. When a motor is not available, manually turn the VFO to check the duty ratio.
	2) EN1 duty ratio adjustment : Turn both CW and CCW CW : Clockwise CCW : Counter clockwise			EN1 (2-2)	Encoder	VR1		After adjusting with the VFO control turned CW, check that intervals D and E are also identical when the VFO control is turned CCW.
	3) EN2 duty ratio adjustment : Turn in the both directions.			EN2 (2-3)		VR2	Adjust until intervals D and E are equal to each other with point C placed at the center.	

## TS-811 ADJUSTMENT

TOP VIEW

**BOTTOM VIEW**





## ADJUSTMENT

TS-711A/E, TS-811A/B/E

## Microprocessor operation check

Item	Condition	Operation check
1. Reset	1) Set the Power SW ON, while depressing the A=B key. Then release the A=B key.	Display : A VFO 145.000 B VFO 433.000 MODE SW : CW LED light on. The "Beeper" sounds. Encoder is the click position.
2. MODE function (FM, USB, CW, LSB, AUTO)	1) Change MODE (ex. : depress CW once) <b>Note</b> : If depress same MODE key then same morse code continuously	CW : "C" morse code Ex. : FM --- USB --- CW --- LSB --- AUTO ---
3. Encoder	1) MODE SW : FM (push once) Turn the main dial knob to CW and CCW.	STEP LED (K, M1, M2, X) T/W OFF 5kHz 12.5kHz ON 5kHz 5kHz
4. CH.Q (Channel quick)	1) Push the CH.Q key once.	The plunger sounds. Display : VFO A 144.000.0 → 100Hz order VFO B 434.000.0 Release click function on VFO knob.
5. A/B	1) Push the A/B key once  2) Push the A/B key again.	The plunger sounds. (Release click function) Display : A VFO 144.000.0 B VFO 434.000.0 MODE SW : CW, AUTO LED light on. A VFO 145.000 B VFO 433.000
6. STEP	1) Push the STEP key once. 2) Turn the main dial CW and CCW. 3) Push the CH.Q key once. (click off condition) 4) Push the STEP key again	The "Beeper" sounds. STEP LED (orange) light on Up and Down each 10kHz step. (VFO A, FM mode) Display shows 7 digits and become fast step as of STEP off. STEP LED light off. (STEP function off) The "Beeper" sounds.
7. SPLIT	1) Push the SPLIT key once (VFO A and VFO B frequency works for both TX and RX) Transmitt  2) Push the SPLIT key again	The "Beeper" sounds Display : SPLIT light on. Ex. : A VFO SPLIT 145.000 B VFO SPLIT 144.000.0 A VFO SPLIT 433.000 B VFO SPLIT 434.000.0 Display : SPLIT light off. (SPLIT function off)

Item	Condition	Operation check
8. A = B (VFO A and VFO B become same frequency)	1) Push the A=B key once.  2) Push the A/B key once	The "Beeper" sounds. Ex. VFO A : 145.000 TS-711 VFO B : 144.000.0 TS-811 VFO A : 435.000 VFO B : 434.000.0 The "Beeper" sounds. Display changes to VFO B and shows same frequency as VFO A.
9. COM CH	1) Push the COM key once.	The "Beeper" sounds. COM LED : Light on Display : A 145.000 B 433.000 In case COM CH working, the main dial UP, DOWN, CH.Q, A/B STEP, SPLIT, SCAN and M.I.N functions are not work.
10. MHz	1) Push the MHz SW (UP) one by one. 2) Push the MHz SW (UP) continuously. 3) Push the MHz SW (DOWN) one by one. 4) Push the MHz SW (DOWN) continuously.	UP MHz order 1MHz each or push. The "Beeper" sounds each push. UP MHz order continuously. Down MHz order 1MHz each one push. The "Beeper" sounds each push. Down MHz order continuously.
11. SCAN	1) MODE SW : SCAN push once.	The "Beeper" sounds. The dot point light winks. Start SCAN after 6 seconds.
SCAN Step		Display 5 digit    Display 5 digit    Display 6 digit    Display 6 digit STEP : ON    STEP : ON    STEP : ON    STEP : ON FM 20kHz step    10kHz step    5kHz step    5kHz step CW, SSB 5kHz step    1kHz step    1kHz step    1kHz step
2) STBY : SEND		Stop SCAN
3) SCAN start : Push SCAN again.		The "Beeper" sounds. (SCAN stop)
12. Memory (Write)	1) Push the M.IN key once. (Desire frequency)  2) MODE SW : CH.S push once. Turn main dial CW. Ex. Set to  3) MODE SW : CH.S push again.  4) Memo in up to 40 channel following 1), 2), 3)	The "Beeper" sounds (Memorized frequency) Frequency has memorized with any mode. The "Beeper" sounds (Main dial works only on MHz order.) Changes only on M.CH display. The "Beeper" sounds (Main dial works as VFO knob) The "Beeper" sounds each M.IN, CH.S push.

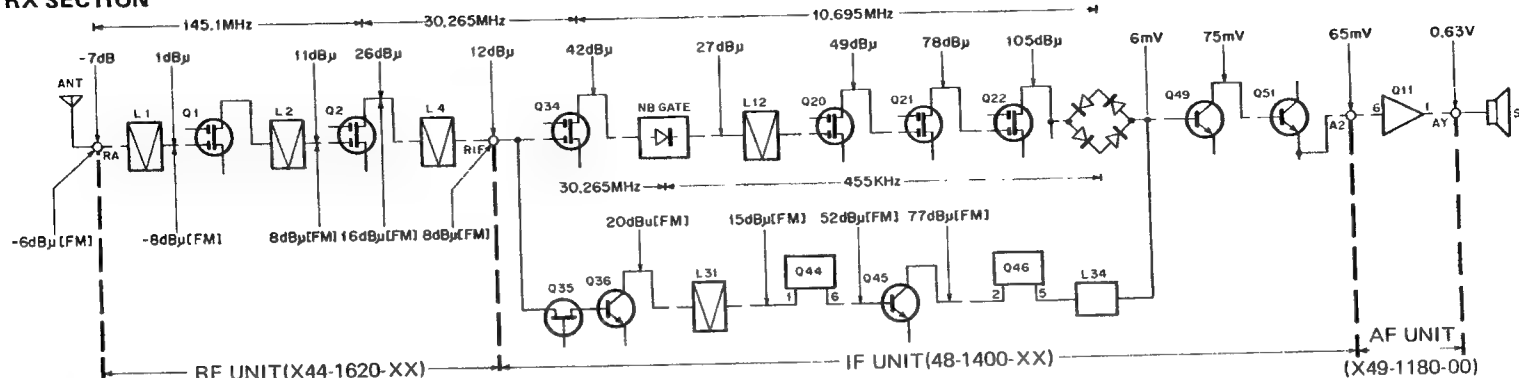
## ADJUSTMENT

TS-711A/E, TS-811A/B/E DCS (Digital Code Squelch) system operation check

Item	Condition	Operation check
13. Memory (Recall)	1) Recall memorized frequency at item 12. Push the VFO/M key once.  2) Tuning the main dial  3) Push the VFO/M key again.	The "Beeper" sounds. Display : MEM 144.030 MEM 433.030 Which is MEMO IN on CH1 Display shows memorized CH and frequency. The "Beeper" sounds Display shows VFO frequency.
14. M=V	1) Transfer MEMO frequency to VFO. Ex. MEMO frequency : 144.800 : 433.800 VFO A frequency : 144.000 : 434.000 Push the M=V key once.	1 Display MEM 144.800 MEM 433.800 The "Beeper" sounds. 2 Display A VFO 144.000 B VFO 434.000 Display has transfer 1 to 2
15. Frequency	1) MODE SW : REV & LOCK push once. 2) Turn main dial CW and CCW. 3) MODE SW : REV & LOCK push again.	The "Beeper" sounds. REV & LOCK LED light on. Confirm the display does not change. The "Beeper" sounds. REV & LOCK LED light off. (Freq. lock free)
16. Alert (AL)	1) MODE SW : AL push once 2) RX : 6 seconds each 3) MODE SW : AL push again	The "Beeper" sounds. Display shows AL. Confirm the "Beeper" sounds. The "Beeper" sounds AL sign disappear.

Item	Condition	Operation check
1. Digital code input	1) Display . any Push the CS key once  2) Digital code input MODE SW : FM-CH.S has dual function as digital code and each key works ; FM : 1-CH.S : 0  3) Turn main dial one click CW, and input digital code following step 2). 4) Input digital code for C 0 ~ C 9 turning main dial. 5) Push the D.SQ key when digital code has displayed.	The "Beeper" sounds. Display : C 0 00000 (Digital code has 5 digits and can input 9 kind) Each one input makes "Pi" sound and each 5 digit input makes "Pee" sound. Display : C 1 00000 Confirm "Pee" sound at each 5 digit input. C 0 . Dot light winks. If push the D.SQ key again, this dot has disappear.
2. Call sign input	1) Push the C.AL key while digital code has displayed. 2) Push the C.AL key again.	The "Beeper" sounds. C - 000000 1st 2nd 3rd C : 000000 4th 5th 6th Ex. : J A 1 Y K X ↑ ↑ ↑ ↑ ↑ ↑ 74 65 49 89 75 88
3. DCS system	1) Set monitor's radio to condition below. Digital code : 6 7 8 9 0 MODE SW : FM DCS : ON 2) MODE SW : FM VFO : 148.0000 Push the DCS key once. 3) Push the CS key once. Push the 6, 7, 8, 9, 0 key each time. Push the CS key once after checks. 4) Push the D.SQ key once. SQL VR : MIN 5) Push the C.AL key once. Monitor : SEND Push the C.AL key once after check. 6) STBY : SEND	DCS LED light on. CO 6 7 8 9 0 D.SQ LED light on. Squelch closed. C. AL LED light on. Squelch opened. D. SQ LED light off. The "Beeper" sounds. (Monitor's radio : "Beeper" sounds heard during transmit.) "Beeper" sounds heard when TX.

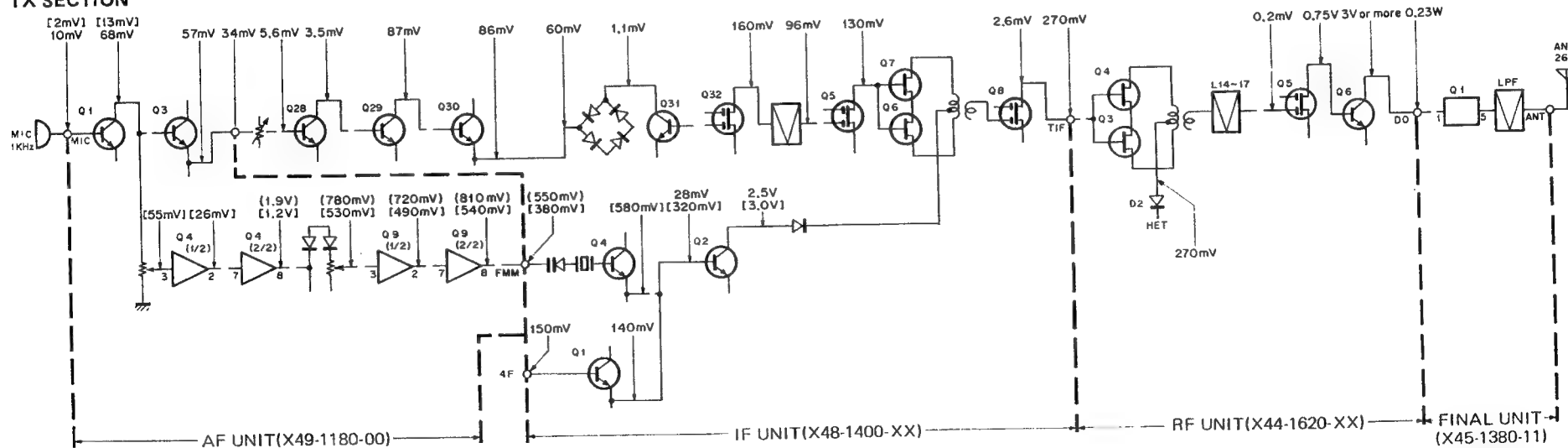
## RX SECTION



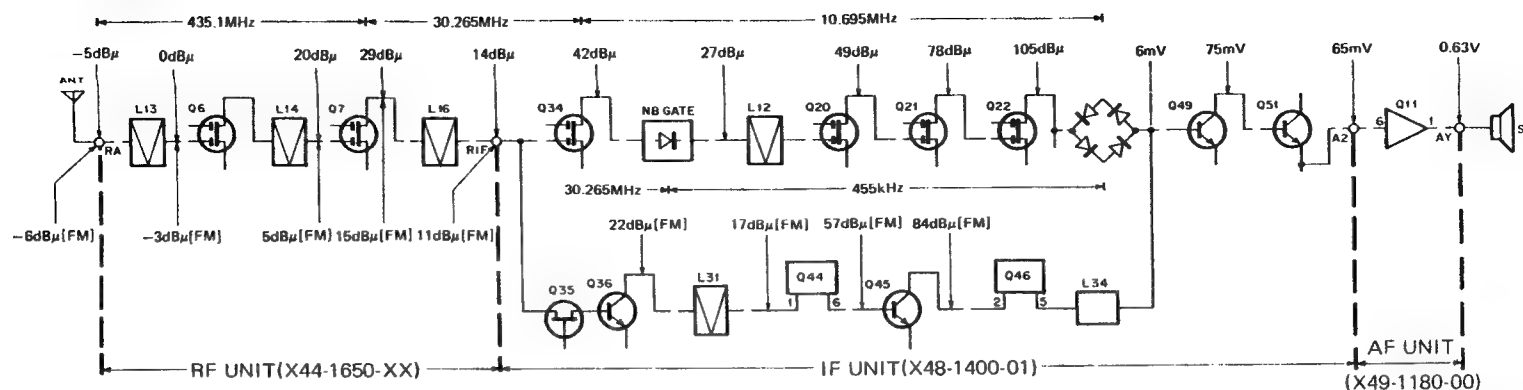
1. First, set the AF gain control for an audio output of 0.63V/8Ω for an SSG input signal at 145.1MHz/-6dBμ, applied to the antenna terminal, the AF gain control is now fixed. Thereafter, only the SSG signal level injected at each point is varied, as required to obtain the same audio output.
2. In the FM mode, the SSG signal level at each point required to obtain the same S/N ratio as that at initial input of the reference -6dBμ is taken.

3. In the stages after the product detector, the AF output level is measured.
4. Level measurement is made with a 0.01μF titanium oxide porcelain capacitor connected to the SSG output.
5. For level measurement at the RA terminal point, the SSG cable connection is changed to this terminal.

## TX SECTION



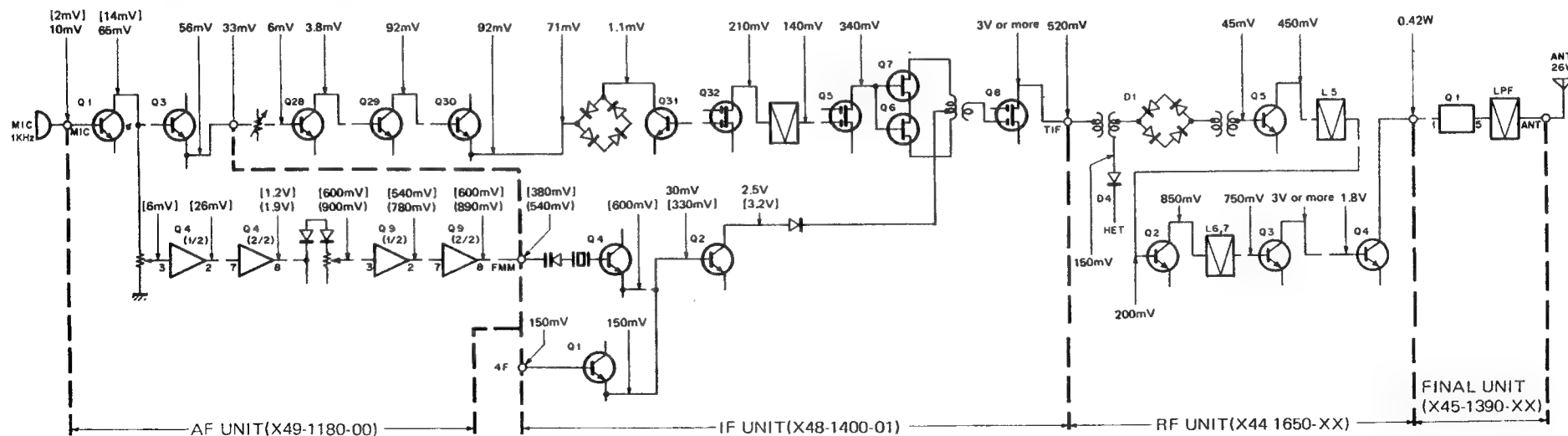
## RX SECTION



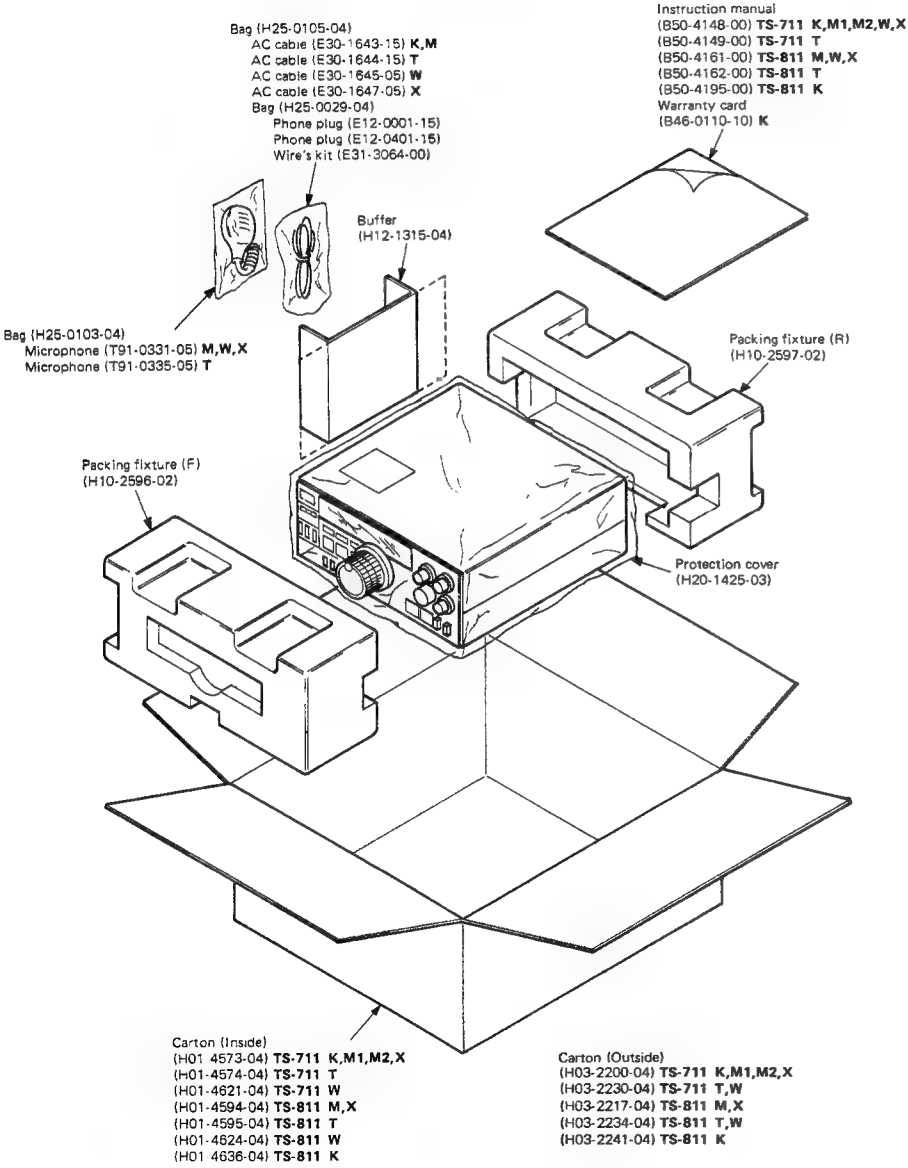
1. First, set the AF gain control for an audio output of 0.63V/8Ω for an SSG input signal at 435.1MHz/-6dBμ, applied to the antenna terminal, the AF gain control is now fixed. Thereafter, only the SSG signal level injected at each point is varied, as required to obtain the same audio output.
2. In the FM mode, the SSG signal level at each point required to obtain the same S/N ratio as that at initial input of the reference -6dBμ is taken.

3. In the stages after the product detector, the AF output level is measured.
4. Level measurement is made with a 0.01μF titanium oxide porcelain capacitor connected to the SSG output.
5. For level measurement at the RA terminal point, the SSG cable connection is changed to this terminal.

## TX SECTION



PACKING



TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal name	Terminal Function
SWITCH UNIT (X41-1580-XX)			
①	1	FS	Frequency STEP LED
	2	FL	Frequency LOCK LED
	3	DC	DCL LED
	4	CL	CHL LED
	5	CS	CSQ LED
②	6	E	GND (Earth)
	7	BD	Busy Display
	8	TL	TX LED
③	1	FS	Frequency STEP LED
	2	FL	Frequency LOCK OUT
	3	DC	DCL LED
	4	CL	CHL LED
	5	CS	CSQ LED
④	6	CA	CALL LED
	7	BD	Busy Display
	8	TL	TX LED
⑤	1	A1	Port A1
	2	A2	Port A2
	3	A3	Port A3
	4	A4	Port A4
	5	A5	Port A5
	6	A6	Port A6
	7	B0	Port B0
	8	B1	Port B1
	9	B2	Port B2
	10	B3	Port B3
	11	B4	Port B4
	12	B5	Port B5
	13	B6	Port B6 VOICE Switch
⑥	1	C5	KEY Line C5
	2	C4	KEY Line C4
	3	C3	KEY Line C3
	4	C2	KEY Line C2
	5	C1	KEY Line C1
	6	C0	KEY Line C0
	7	A6	Port A6
	8	A5	Port A5
	9	A4	Port A4
	10	A3	Port A3
	11	A2	Port A2
	12	CA	CALL LED
⑦	1	E	GND (Earth)
	2	NBS	Noise Blanker Switch
	3	BD	Busy Display
	4	9T	TX 9V
	5	E2	RIT ENCODER PULSE 2
	6	E1	RIT ENCODER PULSE 1
⑧	1	E	GND (Earth)
	2	ANI	Analog input
	3	MM	MIC MUTE
	4	SS	Standby Switch
	5	ANI	Analog input
	6	E	GND (Earth)
⑨	7	ANO	Analog output
	8	E	GND (Earth)
	2	ACS	Accessory Switch
⑩	1	RL	Relay
	2	RL	Relay

Connector No.	Terminal No.	Terminal name	Terminal Function
①	1	A6	Port A6 KEY SCAN output
	2	E	GND (Earth)
	3	A5	Port A5 KEY SCAN output
	4	B0	Port B0 KEY SCAN input
	5	A4	Port A4 KEY SCAN output
②	1	AU	AUTO LED
	2	LS	LSB LED
	3	CW	CW LED
	4	US	USB LED
	5	FM	FM LED
③	1	FM	FM LED
	2	US	USB LED
	3	CW	CW LED
	4	LS	LSB LED
	5	AU	AUTO LED
④	1	ME	Meter +
	2	E	GND (Earth)
⑤	1	PRS	Processor Switch
	2	RM	RF Meter
	3	ALM	ALC Meter
	4	FSM	FM S Meter
	5	SM	SSB S Meter
	6	SB	Switched B (13.8V)
	7	RL	Relay
	8	ACS	Accessory Switch
	9	E	GND (Earth)
AVR UNIT (X43-1490-11)			
①	1	TH1	Thermister 1
	2	TH2	Thermister 2
	3	E	GND (Earth)
	4	9T	TX 9V
	5	9T	TX 9V
	6	9T	TX 9V
	7	9T	TX 9V
	8	ATX	Anti-TX (No TX when 0V)
	9	ST	Standby output
②	1	5B	B for 5C
	2	CB	Common B
	3	E	GND (Earth)
	4	SB	Switched B (13.8V)
	5	SB	Switched B (13.8V)
	6	E	GND (Earth)
③	1	8R	RX 8V
	2	8R	RX 8V
	3	8R	RX 8V
	4	8R	RX 8V
	5	8R	RX 8V
④	1	8C	+ 8V
	2	8C	+ 8V
	3	8C	+ 8V
	4	8C	+ 8V
	5	8C	+ 8V
	6	8C	+ 8V
	7	E	GND (Earth)
⑤	1	B	+ B
	2	SB	Switched B (13.8V)
⑥	1	FAN	FAN Motor
	2	SB	Switched B (13.8V)

## TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal name	Terminal Function
⑦	1	B	+B
	2	FB	FINAL B (13.8V)
	3	BB	+B (22V)
	4	BA	AVR Transistor Base
	5	EM	AVR Transistor Emitter
	6	EM	AVR Transistor Emitter
⑧	1	BB	
	2	CO	AVR Transistor Collector
	3	E	GND (Earth)
⑨	1	B	+B
	2	FB	FINAL B (13.8V)
	3	BB	+B (22V)
	4	BA	AVR Transistor Base
	5	EM	AVR Transistor Emitter
	6	EM	AVR Transistor Emitter
RF UNIT (X44-1620-XX) TS-711			
①	1	RL	Relay
	2	CV	Control Voltage
	3	9T	TX 9V
	4	E	GND (Earth)
	5	8R	RX 8V
RF UNIT (X44-1650-XX) TS-811			
①	1	9T	TX 9V
	2	E	GND (Earth)
	3	8R	RX 8V
FINAL UNIT (X45-1380-11) TS-711 (X45-1390-XX) TS-811			
①	1	PRO	Protection
	2	RM	RF Meter
	3	TH1	Thermistor 1
	4	9T	TX 9V
	5	PC	Power control
②	1	EM	AVR Transistor Emitter
	2	CO	AVR Transistor Collector
	3	FB	FINAL B (13.8V)
	4	BA	AVR Transistor Base
IF UNIT (X48-1400-XX)			
①	1	4F	4th Frequency
	2	E	GND (Earth)
②	1	E	GND (Earth)
	2	FMM	FM MIC
	3	TO	Tone out (Tone input terminal)
	4	E	GND (Earth)
③	1	9T	TX 9V
	2	9T	TX 9V
	3	CWB	CW +B (8V)
	4	FMB	FM +B (8V)
	5	FMR	FM RX +B
	6	FCB	FM/CW +B
	7	8R	RX 8V
	8	8R	RX 8V
	9	SCB	SSB/CW +B (8V)
④	1	9T	TX 9V
	2	CWT	CW TX +B (8V)
	3	NC	Not connection
	4	FMB	FM +B (8V)
	5	8C	+8V

Connector No.	Terminal No.	Terminal name	Terminal Function
⑤	1	SCR	SSB/CW RX + B
	2	SCR	SSB/CW RX + B
	3	-6	-6V
	4	8C	+8V
	5	8C	+8V
	6	SM	SSB S Meter
⑥	1	SSB	SSB + B
	2	SSB	SSB + B
	3	RG2	RF Gain volume 2
	4	E	GND (Earth)
⑦	1	SSQ	SSB Squelch
	2	CAR	Carrier
⑧	1	E	GND (Earth)
	2	MV2	MIC Volume 2
⑨	1	E	GND (Earth)
	2	FCB	FM CW + B
	3	P1	Power Control 1
	4	9T	TX 9V
	5	RT	Modem Receive Output
⑩	1	E	GND (Earth)
	2	FSM	FM S Meter
⑪	1	SC	Scan Control
	2	BD	Busy Display
	3	SQ	Squelch Volume
	4	8C	+8V
	5	AL	Alert Mute
	6	KEY	KEY
	7	STS	Side Tone Switch
	8	ALM	Alert Mute
⑫	1	8C	+8V
	2	SSB	SSB + B
	3	ALM	ALC Meter
	4	P2	Power Control 2
	5	PRO	Protection
	6	8R	RX 8V
	7	SCR	SSB/CW RX + B
⑬	1	SSQ	SSB Squelch
	2	SSQ	SSB Squelch
	3	E	GND (Earth)
	4	FMR	FM RX + B
	5	BLK	Blanking Pulse
	6	NBS	Noise Blanking Switch
	7	E	GND (Earth)
⑭	1	A1	Audio Volume 1
	2	E	GND (Earth)
⑮	1	SF	Standby Frequency
	2	E	GND (Earth)
AF UNIT (X49-1180-00)			
①	1	8M	MIC 8V
	2	MIC	MIC AF input
	3	E	GND (Earth)
	4	UP	MIC UP
	5	DW	MIC DOWN
	6	SS	Standby Switch
②	1	PRS	Processor Switch
	2	MV1	MIC Volume 1
	3	AN1	Analog input
	4	E	GND (Earth)
	5	FE	Floating earth

## TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal name	Terminal Function
③	1	MM	MIC Mute
	2	DW	MIC DOWN
	3	UP	MIC UP
	4	E	GND (Earth)
	5	SSB	SSB + B
	6	-6	-6V
	7	FMB	FM + B (8V)
④	1	8C	+8V
	2	E	GND (Earth)
	3	FMM	FM MIC
	4	SS	Standby Switch
⑤	1	STS	Sidetone Switch
	2	STS	Sidetone Switch
	3	KEY	KEY
	4	KEY	KEY
	5	DE	Delay
⑥	1	ANO	Analog output
	2	E	GND (Earth)
	3	A1	Audio Volume 1
	4	E	GND (Earth)
	5	A1	Audio Volume 1
	6	E	GND (Earth)
	7	A2	Audio Volume 2
	8	E	GND (Earth)
	9	BZ	Beep out
⑦	1	E	GND (Earth)
	2	AP	Audio Power
	3	CB	Common B
PLL UNIT (X50-1990-XX)			
①	1	CAR	Carrier
	2	E	GND (Earth)
	3	8C	+8V
	4	FMB	FM + B (8V)
	5	CWT	CW TX + B (8V)
	6	9T	TX 9V
	7	LSB	LSB + B (8V)
	8	IFS	IF Shift Voltage
②	1	CP	PLL Clock
	2	DP	PLL Data
	3	EA	PLL A Enable
	4	EB	PLL B Enable
	5	E	GND (Earth)
	6	CV	Control Voltage
③	1	SF	Standard Frequency
	2	E	GND (Earth)
	3	E	GND (Earth)
	4	4F	4th Frequency
④	1	4FH	4th Frequency for HET unit
	2	E	GND (Earth)
	3	8C	+8V
	4	BS	Band Select K only
HET UNIT (X50-2000-00) TS-811 M,T,W,X (X50-2010-10) TS-811 K			
①	1	E	GND (Earth)
	2	4FH	4th Frequency from PLL unit
	3	8C	+8V
	4	BS	Band Select K only
TONE UNIT (X52-1290-60) T,W only			
①	1	5C	
	2	TH	Tone on : H (5V)
	3	TI	Tone input
	4	E	GND (Earth)

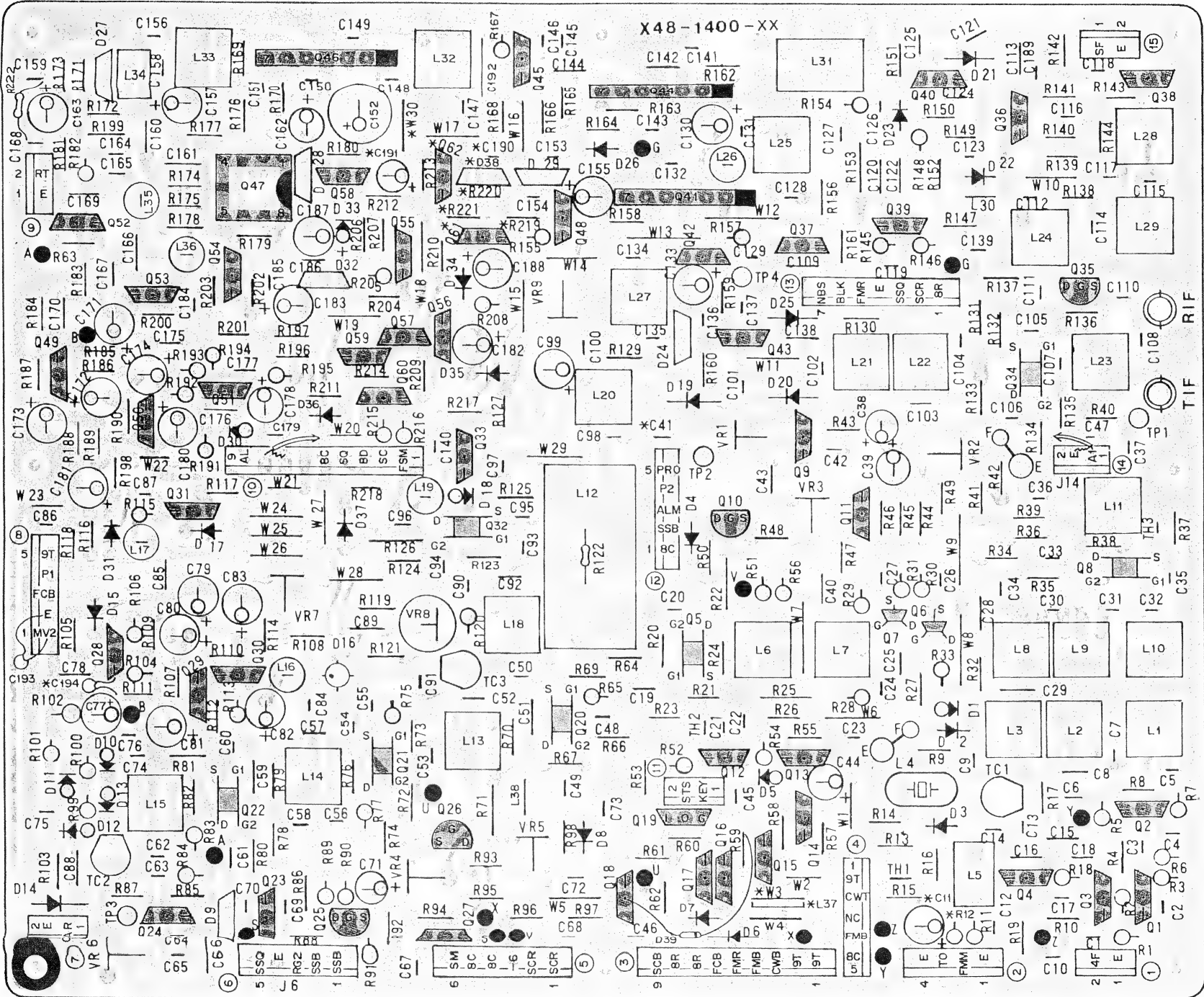
Connector No.	Terminal No.	Terminal name	Terminal Function
CONTROL UNIT (X53-1410-XX)			
①	1	E	GND (Earth)
	2	E2	RIT ENCODER PULSE 2
	3	E1	RIT ENCODER PULSE 1
②	1	E	GND (Earth)
	2	EN1	MAIN ENCODER PULSE 1
	3	EN2	MAIN ENCODER PULSE 2
	4	EN3	MAIN ENCODER PULSE 3
	5	5C	Common 5V
	6	PS	PLANGER SENSOR
	7	PN	PLANGER SWING PULSE
③	1	FS	Frequency STEP LED
	2	FL	Frequency LOCK LED
	3	DC	DCL LED
	4	CL	CHL LED
	5	CS	CSQ LED
	6	CA	CALL LED
④	1	MM	MIC MUTE
	2	MM	MIC MUTE
	3	SQS	Squelch Select
	4	BLK	Blanking Pulse
	5	AL	Alert Mute
	6	DW	MIC DOWN
	7	UP	MIC UP
	8	SC	SCAN Control 5.4V (Busy : H)
⑤	1	E	GND (Earth)
	2	WR	Write strobe
	3	RD	Read strobe
	4	CS	Chip Select
	5	C/D	Common/Data
	6	RDY	Receiver Ready
	7	SB	Switched B (13.8V)
⑥	1	D7	Data Bus 7
	2	D6	Data Bus 6
	3	D5	Data Bus 5
	4	D4	Data Bus 4
	5	D3	Data Bus 3
	6	D2	Data Bus 2
	7	D1	Data Bus 1
	8	D0	Data Bus 0
	9	RES	Reset
⑦	1	T1	Tone data 1
	2	T2	Tone data 2
	3	T3	Tone data 3
	4	T4	Tone data 4
	5	T5	Tone data 5
	6	T6	Tone data 6
	7	5C	
	8	TH	Tone on : H (5V)
	9	TI	Tone input
	10	E	GND (Earth)
⑧	1	PSQ	
	2	PS1	
	3	PS2	
	4	PS3	
	5	PS4	
	6	SR	
	7	BY	
	8	5C1	

## TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal name	Terminal Function
⑨	1	TO	Tone out
	2	E	GND (Earth)
	3	AN1	Analog input
	4	E	GND (Earth)
	5	RT	Modem Receive Input
	6	E	GND (Earth)
	7	BZ	Beep out
	8	E	GND (Earth)
⑩	1	BC2	VS-1
	2	E	
	3	VO	
⑪	1	SB	B for 5C
	2	E	GND (Earth)
	3	ST	Standby out
	4	SB	Switched B
⑫	1	DD	PLL Data
	2	E	GND (Earth)
	3	CP	PLL Clock
	4	EA	PLL A Enable
	5	EB	PLL B Enable
⑬	1	11C	Common 11V
	2	-6V	-6V
	3	DD	Display Data
	4	CD	Display Clock
	5	ED	Display Enable
	6	5C	Common 5V
	7	E	GND (Earth)
⑭	1	CWB	CW + B (8V)
	2	CWB	CW + B (8V)
	3	CWB	CW + B (8V)
	4	FMB	FM + B (8V)
	5	FMB	FM + B (8V)
	6	LSB	LSB + B (8V)
	7	SCB	SSB/CW + B (8V)
	8	SSB	SSB + B (8V)
	9	SSB	SSB + B (8V)
	10	ATX	Anti-TX
	11	8C	Common 8V
⑮	1	AU	AUTO LED
	2	LS	LSB LED
	3	CW	CW LED
	4	US	USB LED
	5	FM	FM LED
⑯	1	-6	-6V
	2	-6	-6V
	3	SS	Standby Switch
	4	SS	Standby Switch
⑰	1	A1	Port A1
	2	A2	Port A2
	3	A3	Port A3
	4	A4	Port A4
	5	A5	Port A5
	6	A6	Port A6
	7	B0	Port B0
	8	B1	Port B1
	9	B2	Port B2
	10	B3	Port B3
	11	B4	Port B4
	12	B5	Port B5
	13	B6	Port B6 VOICE Switch

Connector No.	Terminal No.	Terminal name	Terminal Function
DISPLAY UNIT (X54-1820-11)			
①	1	APO	Audio Power out
	2	E	GND (Earth)
	3	AP	Audio Power
	4	E	GND (Earth)
②	1	PC	Power Control
	2	E	GND (Earth)
	3	MV2	MIC Volume 2
	4	E	GND (Earth)
	5	MV1	MIC Volume 1
	6	P1	Power Control 1
	7	E	GND (Earth)
	8	P2	Power Control 2
③	1	SQS	Squelch Select
	2	SCR	SSB/CW RX + B
	3	IFS	IF Shift Voltage
	4	SQ	Squelch Volume
	5	8C	+ 8V
	6	RG2	RF Gain Volume 2
	7	E	GND (Earth)
④	1	APO	Audio Power out
	2	E	GND (Earth)
	3	AP	Audio Power
	4	E	GND (Earth)
⑤	1	E	GND (Earth)
	2	5C	Common 5V
	3	ED	Display Enable
	4	CD	Display Clock
	5	DD	Display Data
	6	-6V	-6V
	7	11C	Common 11V
⑥	1	E	GND (Earth)
	2	8M	MIC 8V
	3	UP	MIC UP
	4	DW	MIC DOWN
	5	SS	Standby Switch
	6	MIC	MIC AF input
	7	E	GND (Earth)
⑦	1	E	GND (Earth)
	2	SP	Speaker
⑧	1	DE	Delay
	2	E	GND (Earth)
	3	APO	Audio Power out
	4	SS	Standby Switch
	5	SS	Standby Switch
	6	KEY	KEY
	7	STS	Sidetone Switch
	8	CWB	CW + B (8V)
ENCODER ASS'Y (W02-0364-00)			
①	1	E	GND (Earth)
	2	EN1	MAIN ENCODER PULSE 1
	3	EN2	MAIN ENCODER PULSE 2
	4	EN3	MAIN ENCODER PULSE 3
	5	5C	Common 5V
	6	PS	PLANGER SENSOR
	7	PN	PLANGER SWING PULSE

IF UNIT (X48-1400-XX) Component side view  
 (-00 : TS-711 T,W -01 : TS-811 K,M,T,W,X -11 : TS-711 K,M1,M2,X)



	Q61,62	D38	C11	C41	C190,191	C194	R12	R219-221	L37	W3,30
TS-711	T,W	O	O	X	X	O	X	O	X	O
K,M,M2,X	O	O	O	X	X	O	O	O	X	O
TS-811 K,M,T,W,X	X	X	O	O	O	X	O	O	X	O

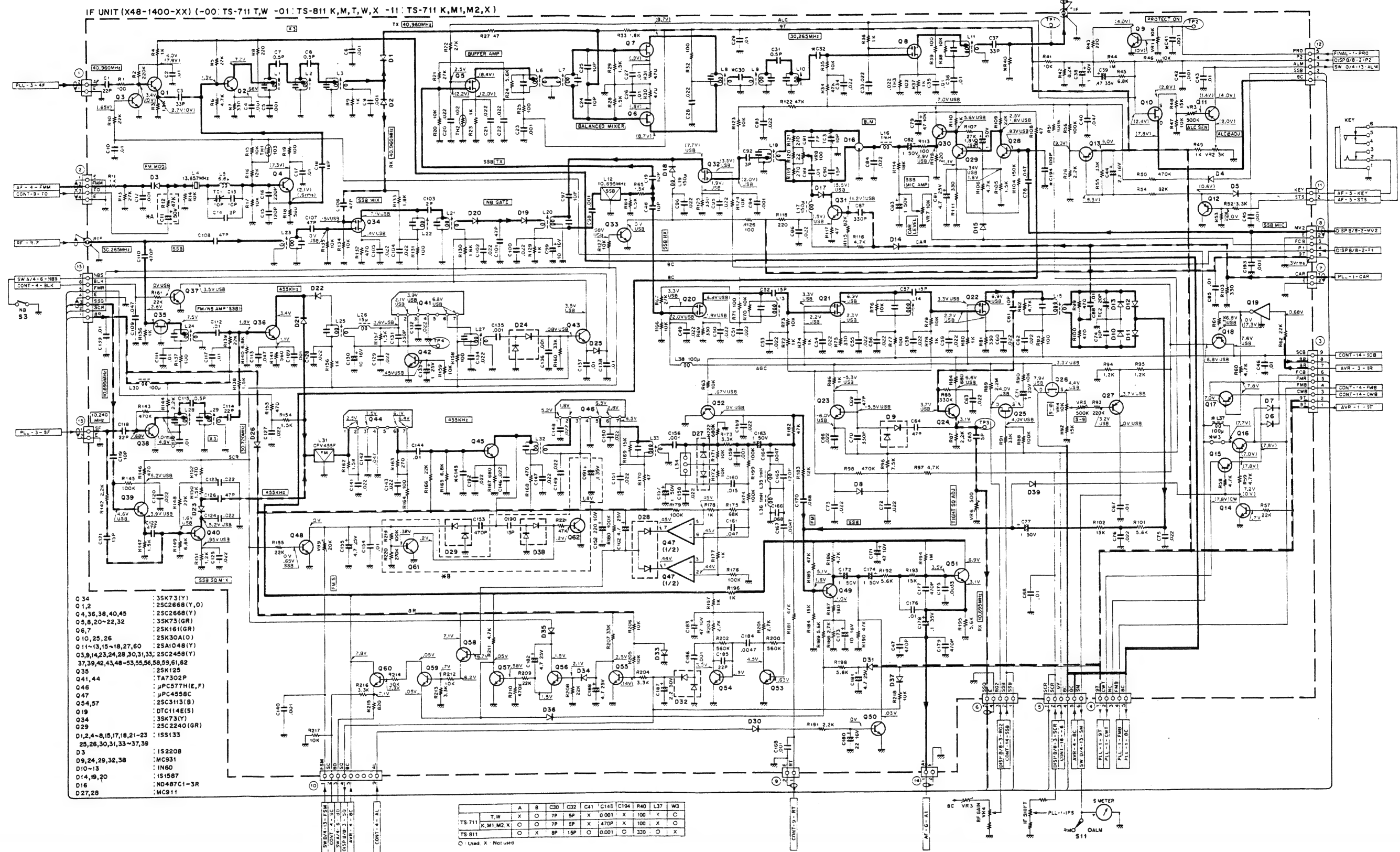
O : Used X : Not used



# CIRCUIT DIAGRAM/PC BOARD VIEW TS-711/811

IF UNIT (X48-1400-XX) (-00 : TS-711 T,W -01 : TS-811 K,M,T,W,X -11 : TS-711 K,M1,M2,X)

f = 145.00MHz (TS-711), 435.00MHz (TS-811),  
RX no signal, ( ) : TX.



2SA1048  
2SC2458  
2SC2668  
2SC3113

2SC2240

2SK161

2SK30A  
2SK125

DTC114E

3SK73

TA7302P  
 $\mu$ PC577H

MC911

MC931

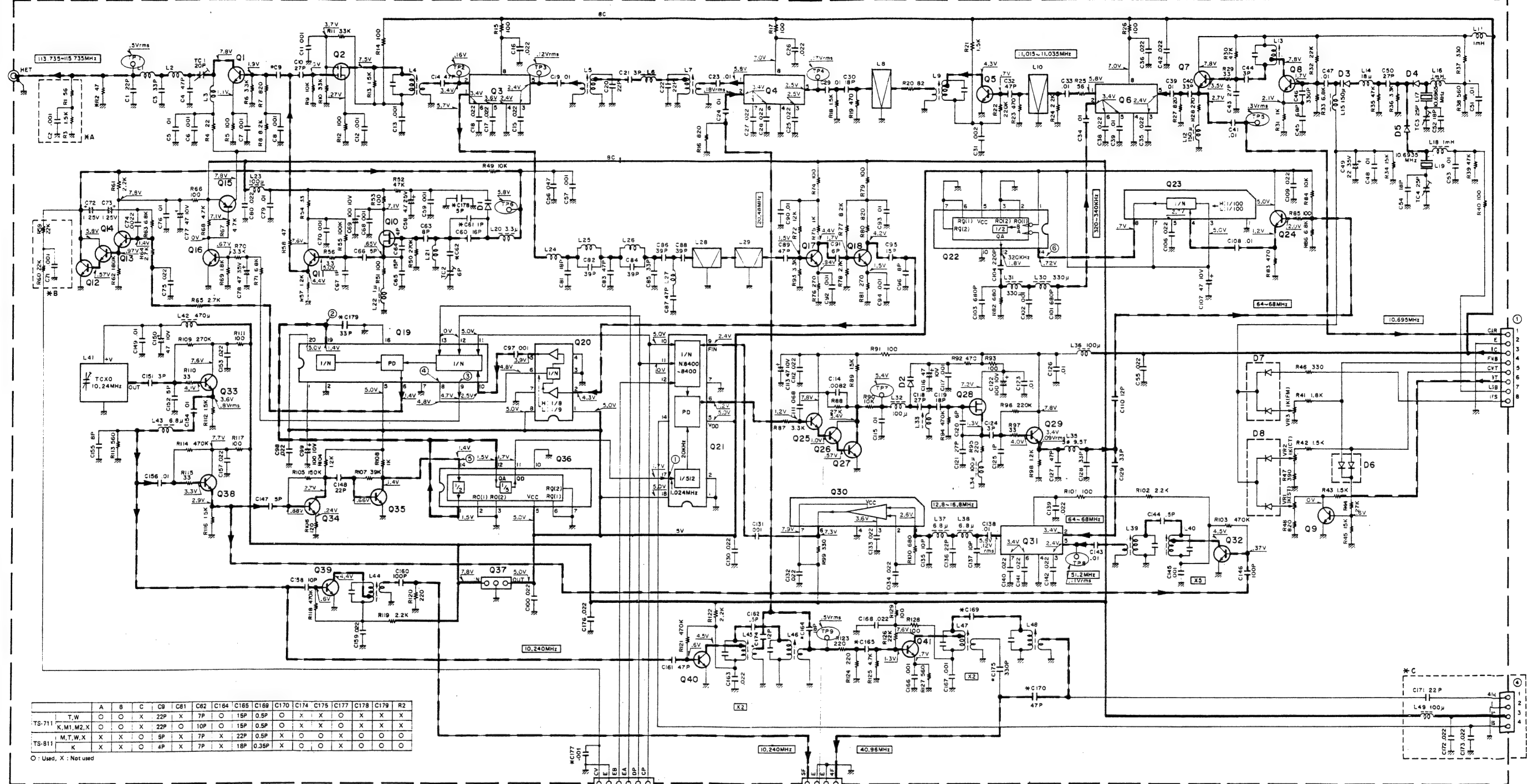


# TS-711/811 CIRCUIT DIAGRAM/PC BOARD VIEW

PLL UNIT (X50-1990-XX) (-00: TS-711 T,W -01: TS-811 M,T,W,X -11: TS-711 K,M1,M2,X -12: TS-811 K)

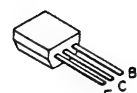
f = 145.00MHz (TS-711), 435.00MHz (TS-811), RX no signal, ( ) : TX.

PLL UNIT(X50-1990-XX)(-00: TS-711 T,W -01: TS-811 M,T,W,X -11: TS-711 K,M1,M2,X -12: TS-811 K)

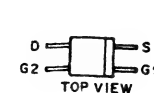


- Q1,5,11,17,18,29,40 : 2SC2668(Y)  
 Q2 : 3SK73(Y)  
 Q3,4,6,31 : SN16913P  
 Q7,8,41 : 2SC2787(L)  
 Q9,16,33~35,38,39 : 2SC2458(Y)  
 Q10,28 : 2SK192A(GR)N  
 Q12~14,25~27 : 2SC2459(BL)  
 Q15 : 2SA1048(Y)  
 Q19 : MC145156P  
 Q20 : μPB555C  
 Q21 : MC145156P \*K  
 Q22,36 : SN74LS90N  
 Q23 : M54459L  
 Q24,32 : 2SC2668(Y,O)  
 Q30 : TA7302P  
 Q37 : NJM78L05A  
 D1~3 : 1SV50  
 D4,5 : MA856  
 D6~8 : MC921

2SA1048  
 2SC2458  
 2SC2459  
 2SC2668  
 2SC2787



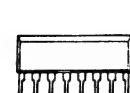
3SK73



2SK192A



M54459L



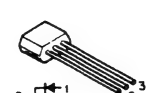
NJM78L05A



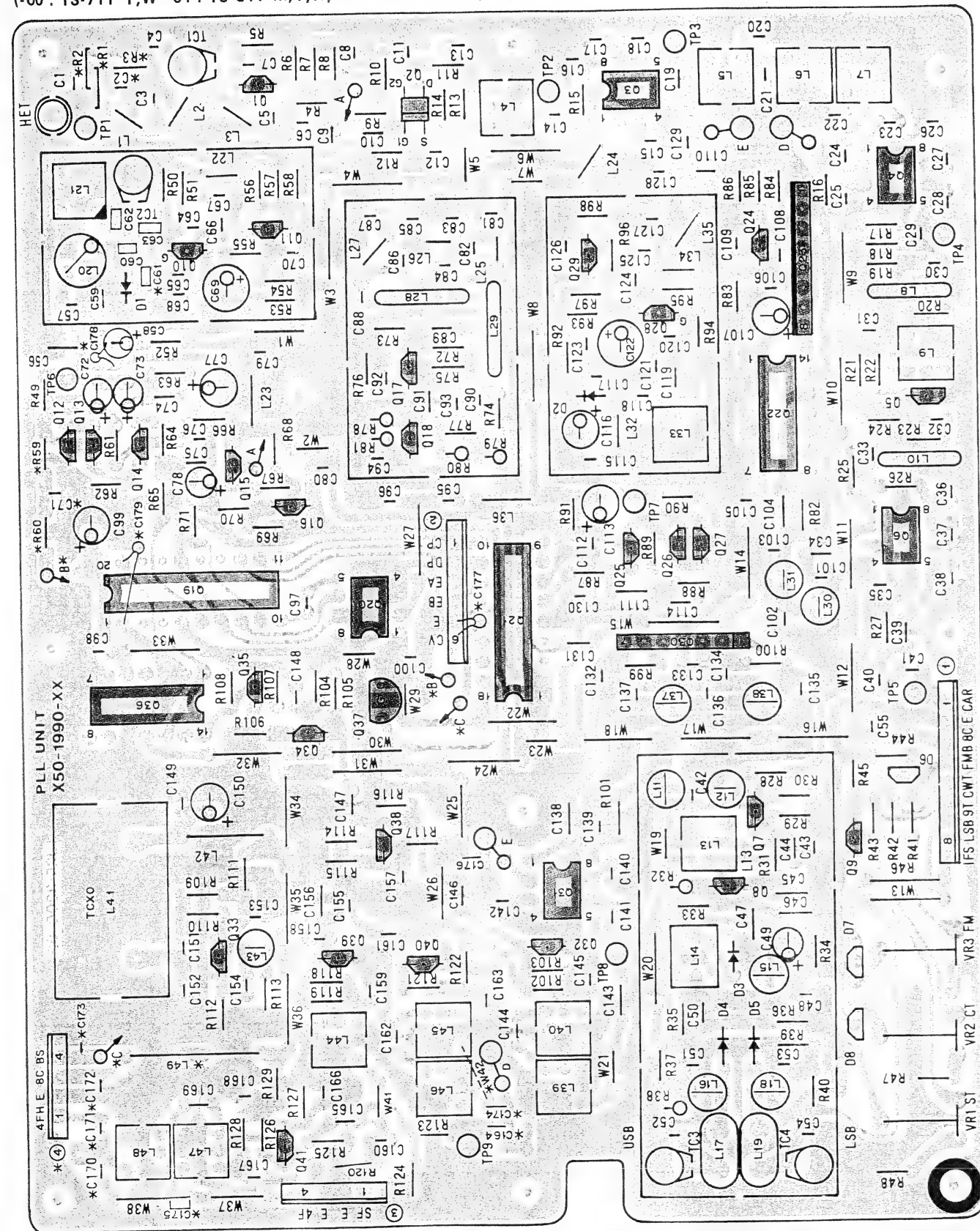
TA7302P



MC921



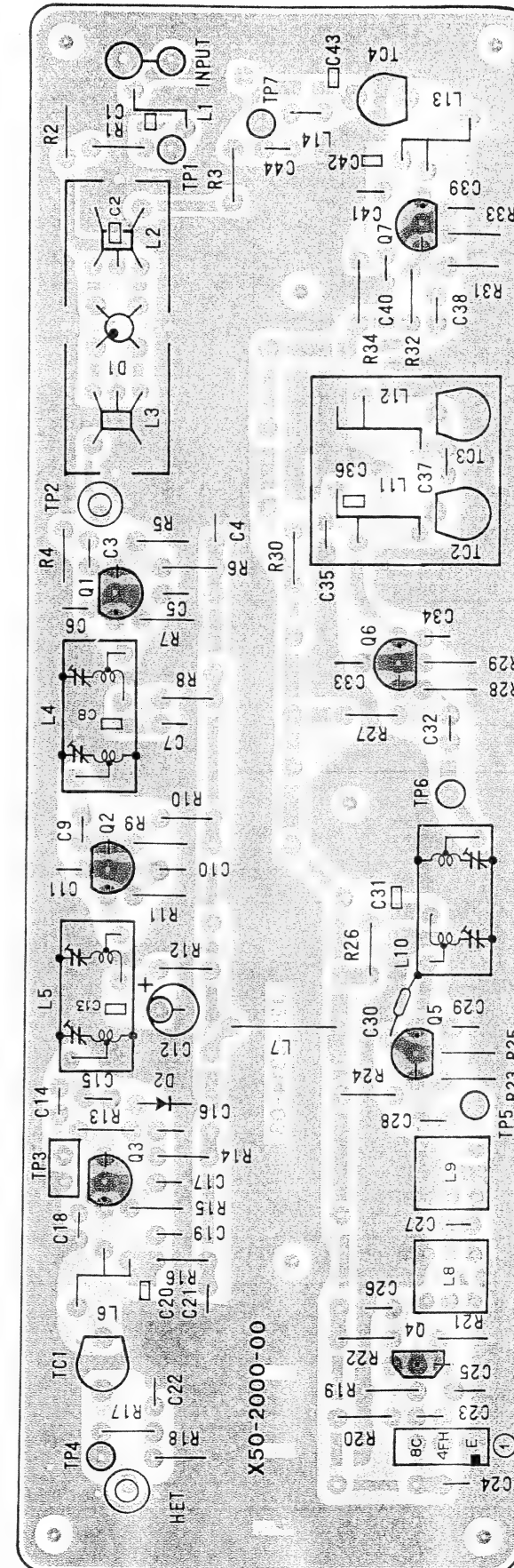
PLL UNIT (X50-1990-XX) Component side view  
 (-00: TS-711 T,W -01: TS-811 M,T,W,X -11: TS-711 K,M1,M2,X -12: TS-811 K)



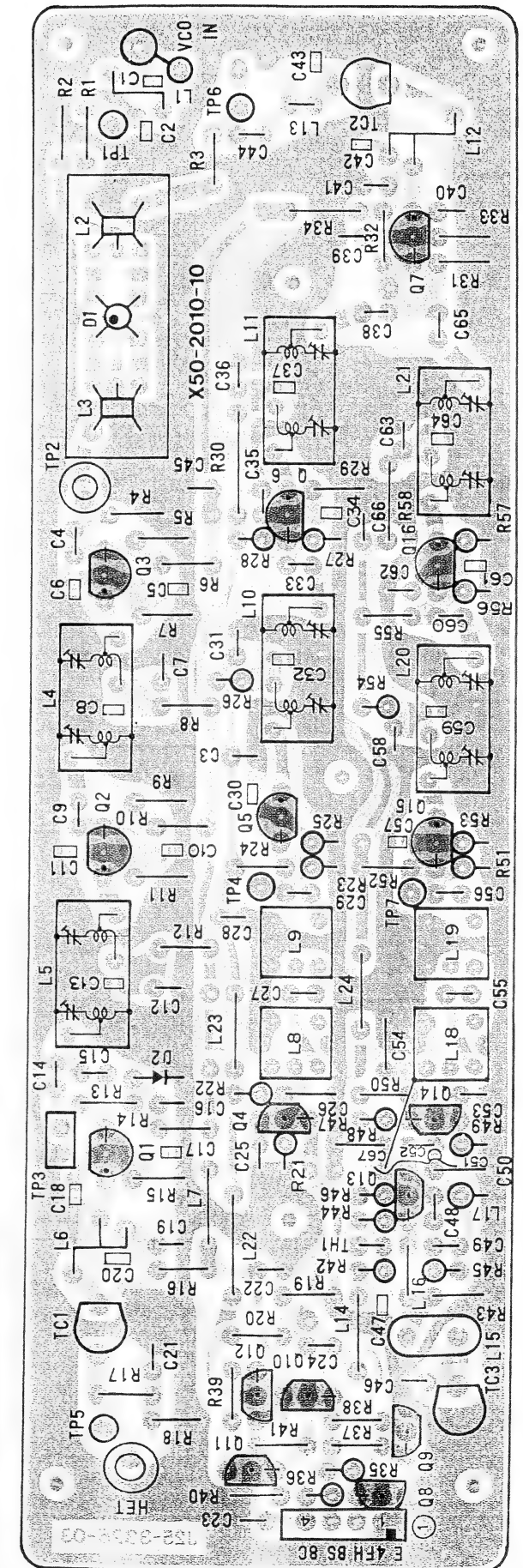
		L49	R1	R2	R3	R59,60	C2	C61	C71	C164	C170	C171-175	C177	C178,179	W42	⑦	B	C
TS-711	T,W	X	O	X	O	O	O	X	O	O	O	X	O	X	X	X	O	X
	K,M1,M2,X	X	O	X	O	O	O	X	O	O	O	X	O	X	X	X	O	X
TS-811	M,T,W,X	O	X	O	X	X	X	X	X	X	X	O	X	O	O	O	X	O
	K	O	X	O	X	X	X	X	X	X	X	O	X	O	O	O	X	O

O: Used X: Not used

HET UNIT (X50-2000-00) Component side view  
 (TS-811 M,T,W,X)



HET UNIT (X50-2010-10) Component side view  
 (TS-811 K)

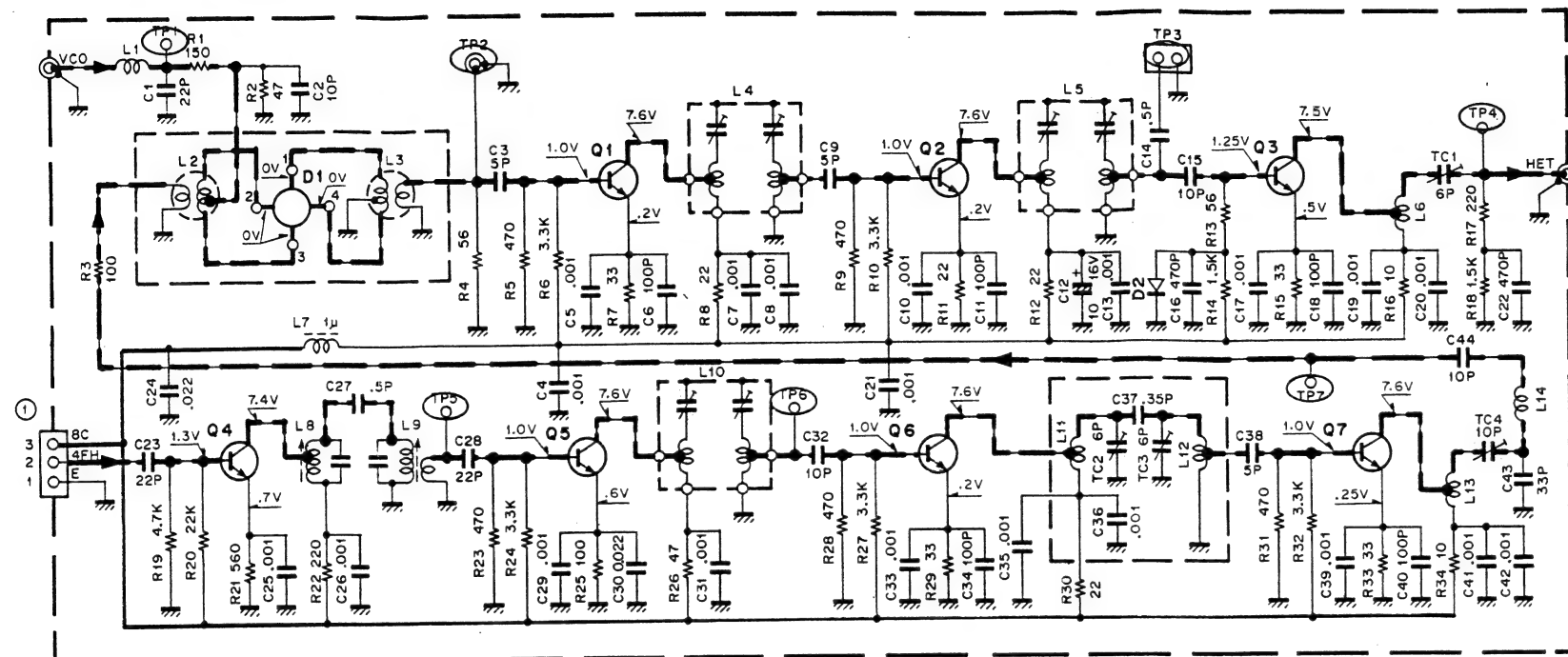




# CIRCUIT DIAGRAMS/PC BOARD VIEWS TS-711/811

HET UNIT (X50-2000-00) (TS-811 M.T.W.X)

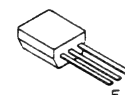
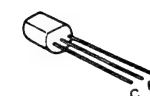
f = 435.00MHz, RX no signal, ( ) : TX.



Q1,2,5~7 : 2SC2026  
Q3 : 2SC2570A  
Q4 : 2SC2787(L)  
D1 : ND487C1-3R  
D2 : MV13

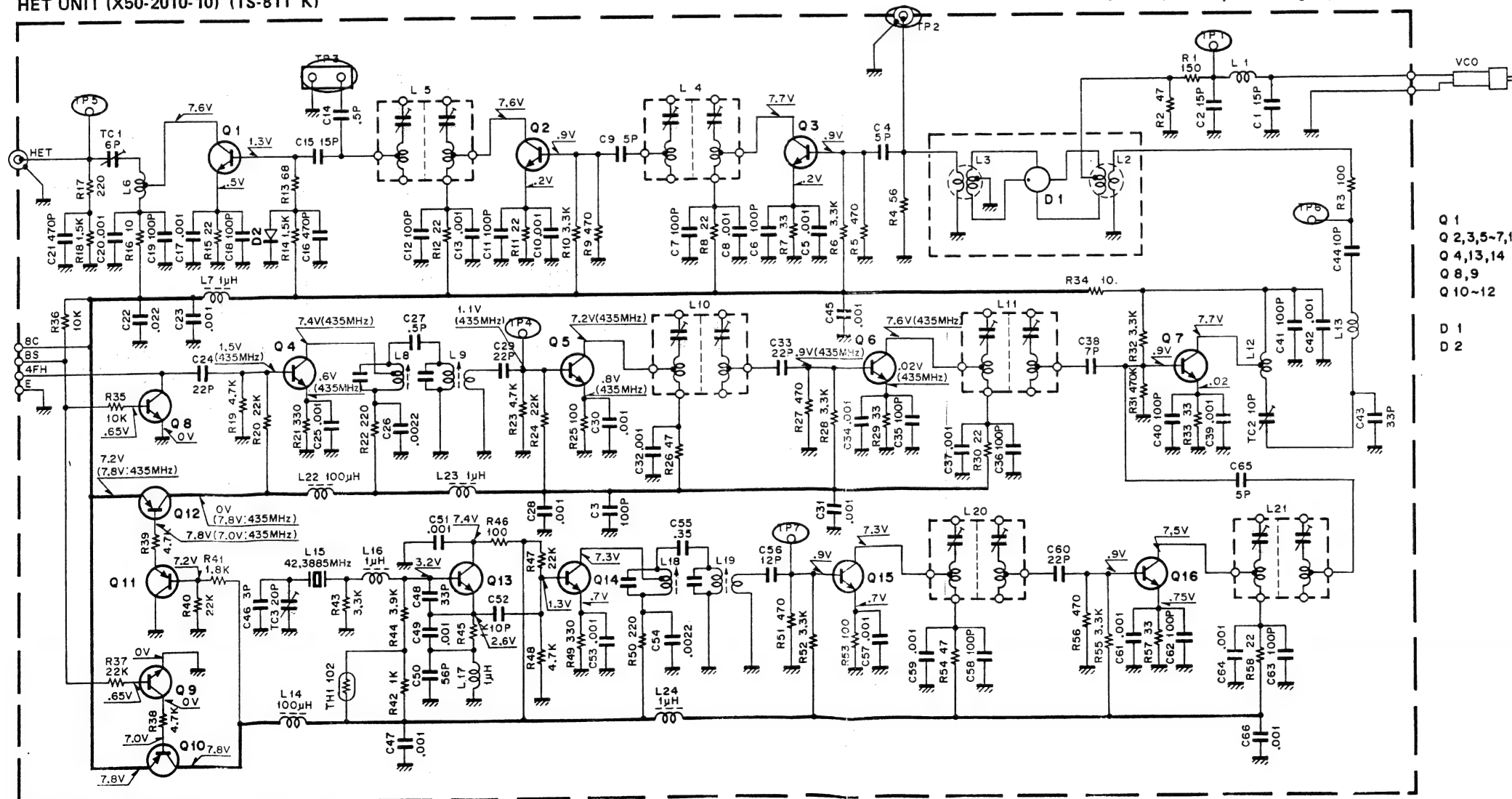
2SC2026  
2SC2570A

2SA933S  
2SC1740S  
2SC2787



HET UNIT (X50-2010-10) (TS-811 K)

f = 445.00MHz, RX no signal, ( ) : TX.

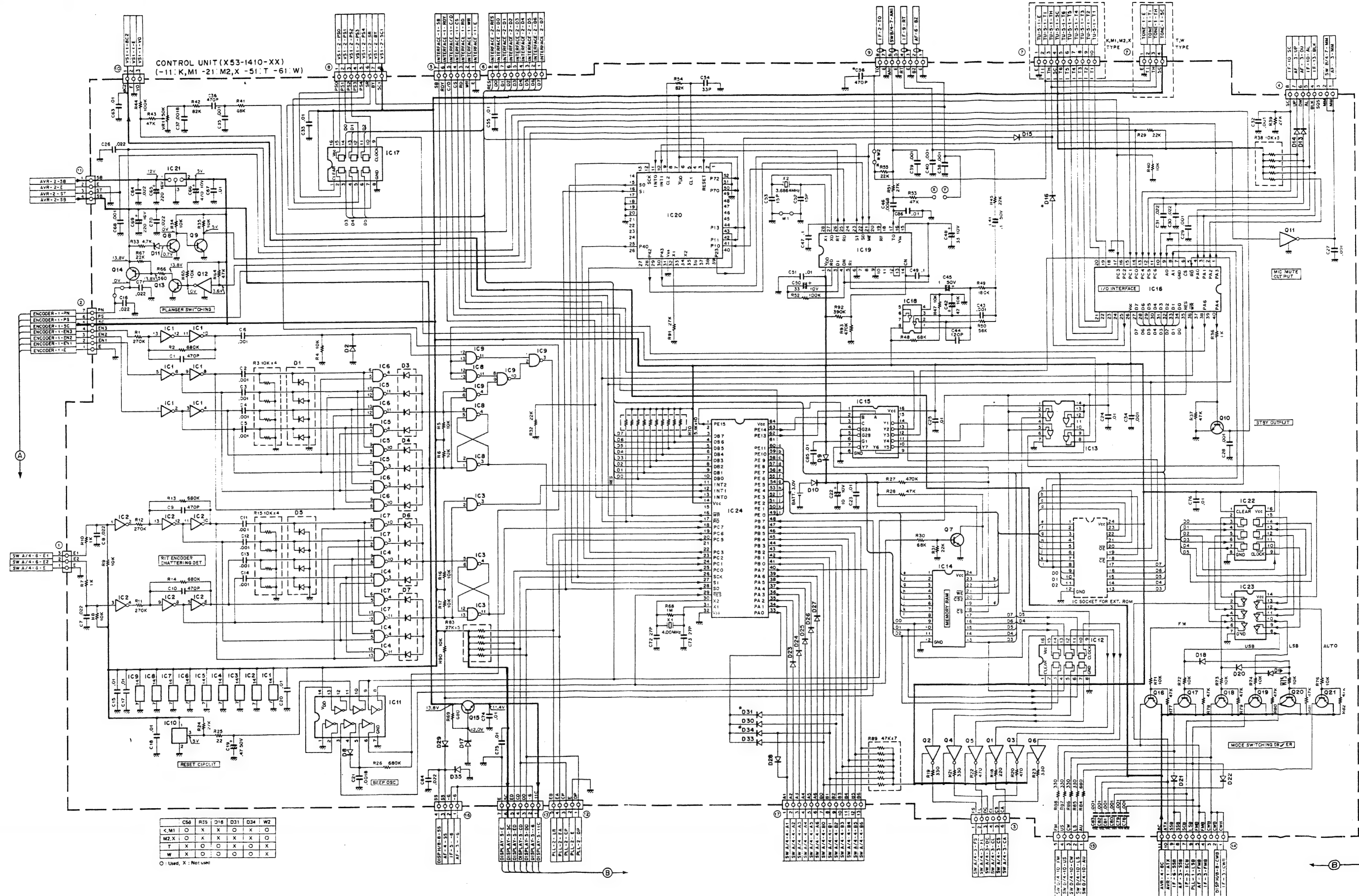


Q1 : 2SC2570A  
Q2,3,5-7,15,16 : 2SC2026  
Q4,13,14 : 2SC2720  
Q8,9 : 2SC1740S(Q)  
Q10-12 : 2SA933S(Q)

D1 : ND487C1-3R  
D2 : MV13

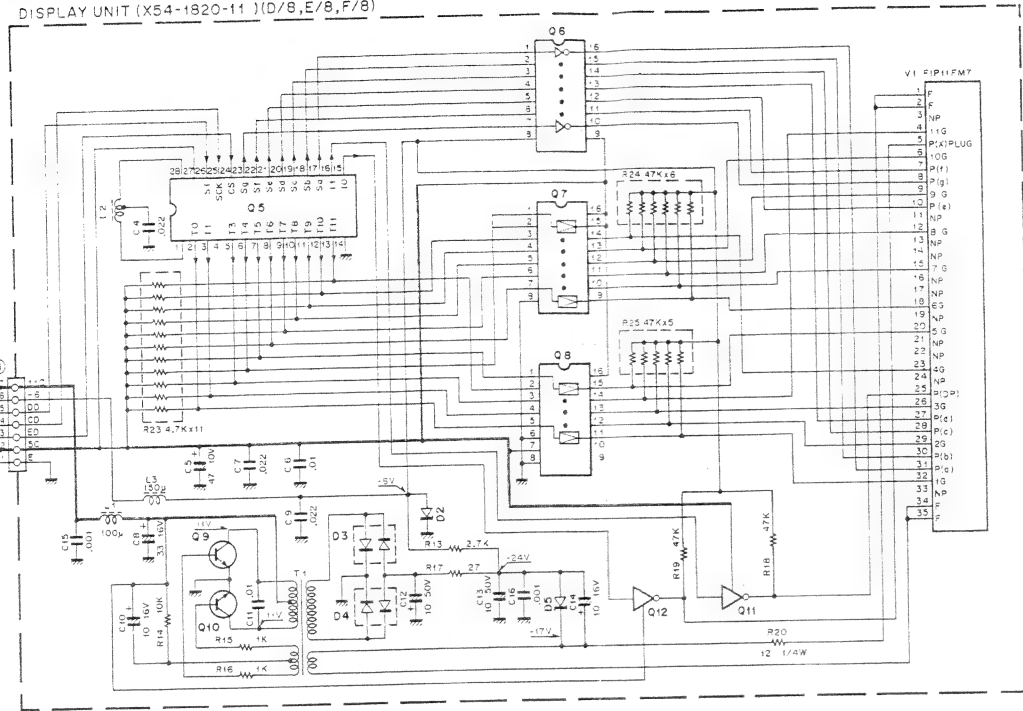
# TS-711A/E CIRCUIT DIAGRAM

CONTROL UNIT (X53-1410-XX) (-11: TS-711 K,M1 -21: TS-711 M2,X -51: TS-711 T -61: TS-711 W)

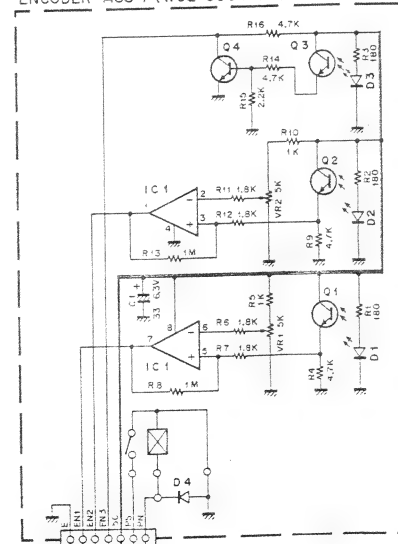


# DISPLAY UNIT (X54-1820-11)

DISPLAY UNIT (X54-1820-11) (D/B, E/B, F/B)



## ENCODER ASS'Y (W02-0364-00)



## ENCODER ASS'Y (W02-0364-00)

- Q1~6 : DTA114(Y)
- Q7~10 : 2SC2458(Y)
- Q11,12 : DTC143T(S)
- Q13 : 2SC1959(Y)
- Q14 : 2SA1307(Y)
- Q15 : 2SC2703(O,Y)
- Q16~20 : 2SA1015(Y)
- Q21 : 2SA1048(Y)
- Q22 : 2SA1115(E)
- IC 1,2 : MC14069UBCP or TC4069UBP
- IC 3~9 : TC4011BP or BU4011BP
- IC 10 : PST518A
- IC 11 : MC14584BCP
- IC 12,17,22 : 74LS174
- IC 13 : 74LS32
- IC 14 : M86418-20LP-GRA
- IC 15 : 74LS138
- IC 16 : 74LS138
- IC 18 : 74LS138
- IC 19 : 74LS138
- IC 20 : 74LS138
- IC 21 : 74LS138
- IC 22 : 74LS138
- IC 23 : 74LS138
- IC 24 : 74LS138
- D1,3~7 : DAP401
- D2,8~10,12~15 : 1SS133
- D16~30,33,35 : 1SS133
- D11 : MT294UB
- D16(T,W) : 1SS133
- D17 : MT294UB
- D31(K,M,W) : 1SS133
- D34(T,W) : 1SS133

- Q5 : 2PD783C
- Q6 : 2PD783C
- Q7,8 : TC5066BP
- Q9,10 : 2SC1959(Y)
- Q11,12 : DTA124(F)
- D2 : MT26.2JA
- D3,4 : MC931
- D5 : MT27.5JA
- Q1,2,3 : PN1265(R)
- Q4 : 2SC2458(Y)
- IC1 : LM358P
- D1,2,3 : LN66(R)
- D4 : VO6B

- 2SA1048
- 2SA1115
- 2SC2458

- 2SA1015
- 2SC1959
- 2SC2703

- 2SA1307

- DTC143T

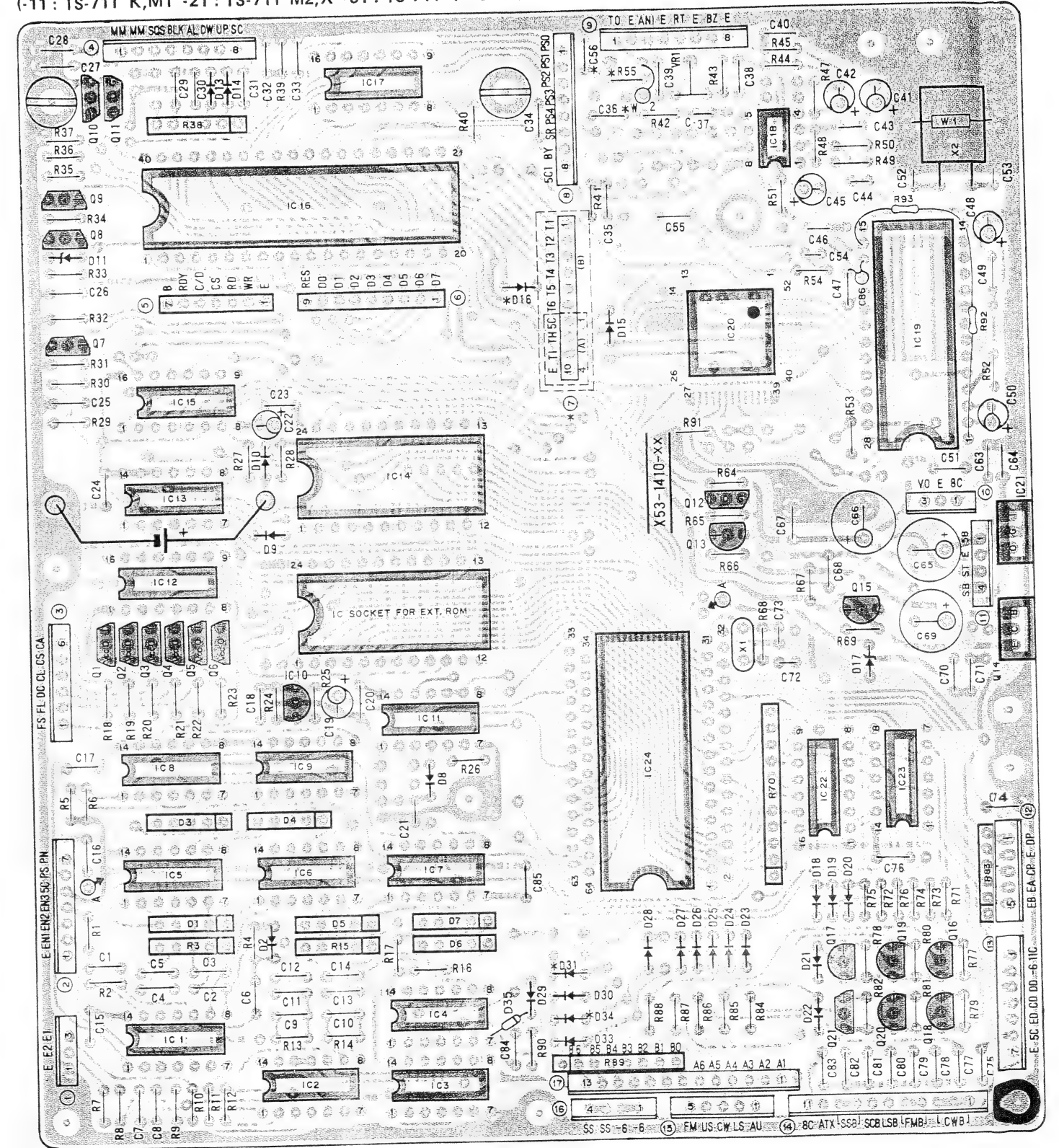
- PST518A

- DTA114Y

- μPC7805H

# CONTROL UNIT (X53-1410-XX) Component side view

(-11 : TS-711 K,M1 -21 : TS-711 M2,X -51 : TS-711 T -61 : TS-711 W)

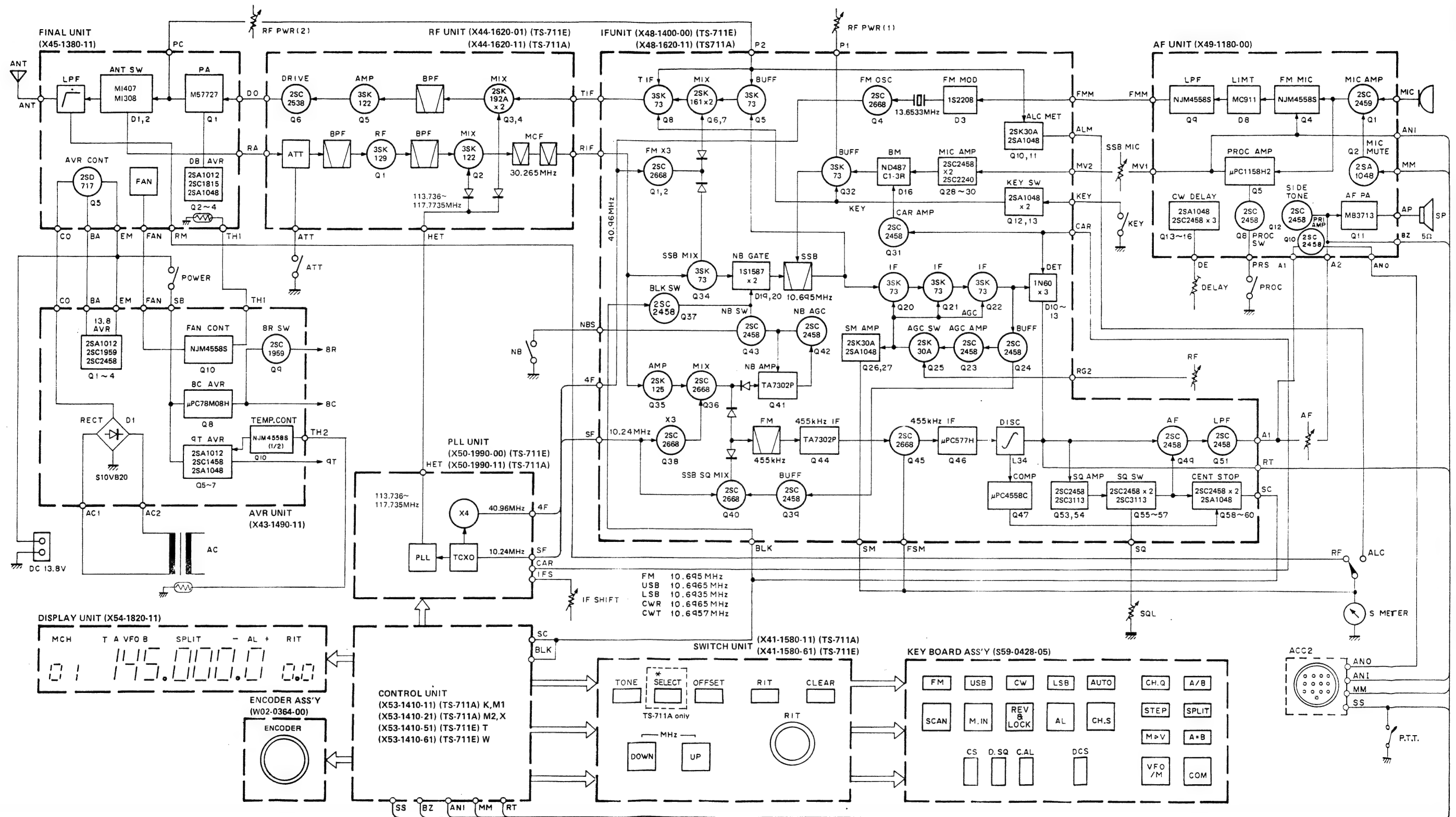


	C56	R55	D16	D31	D34	W2	⑦-(A)	⑦-(B)
K,M1	○	X	X	○	X	○	X	○
M2,X	○	X	X	X	X	○	X	○
T	X	○	○	X	○	X	○	X
W	X	○	○	○	○	X	○	X

○ : Used X : Not used

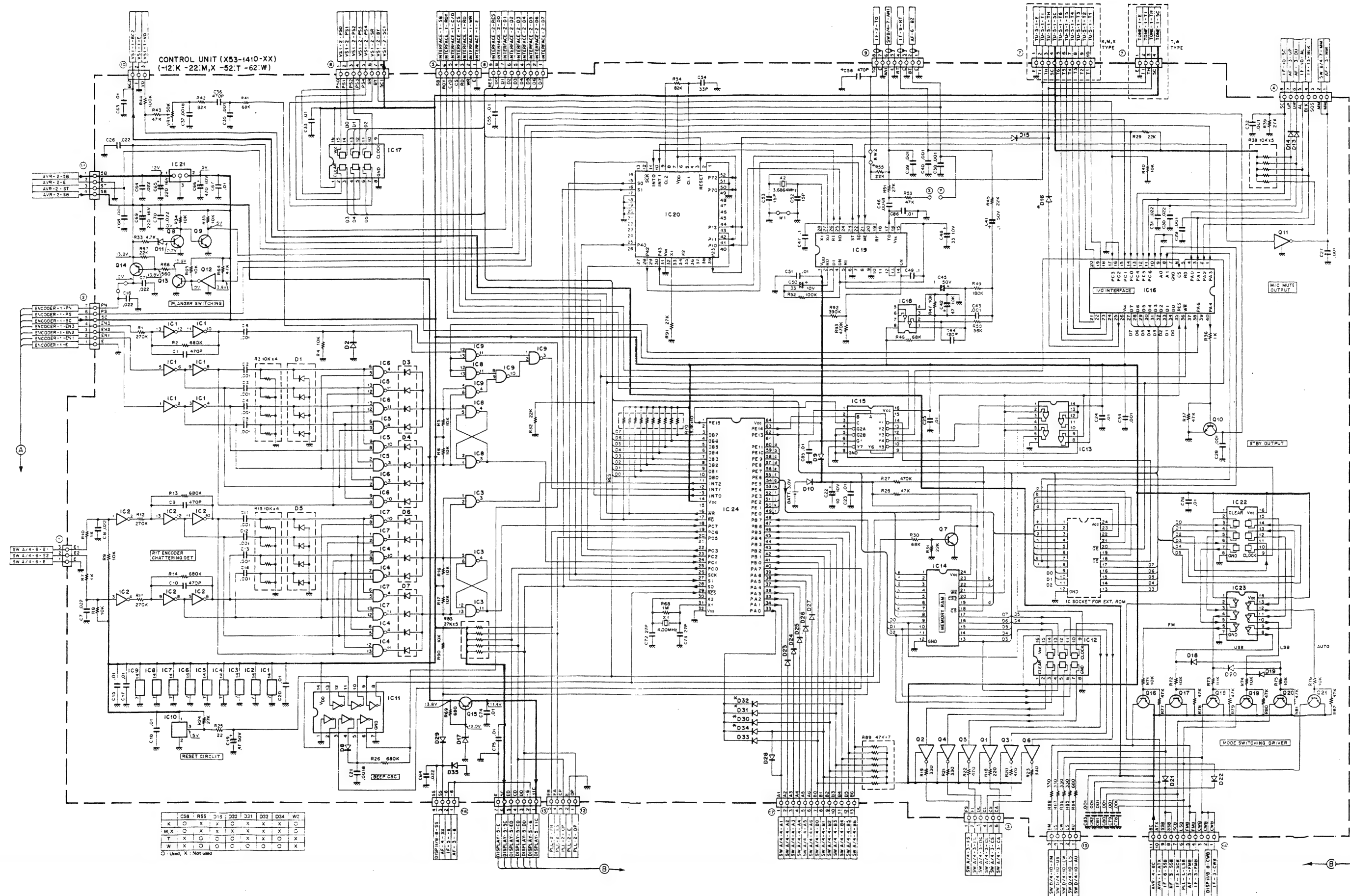


# PC BOARD VIEW/ BLOCK DIAGRAM TS-711A/E



# TS-811A/B/E CIRCUIT DIAGRAM

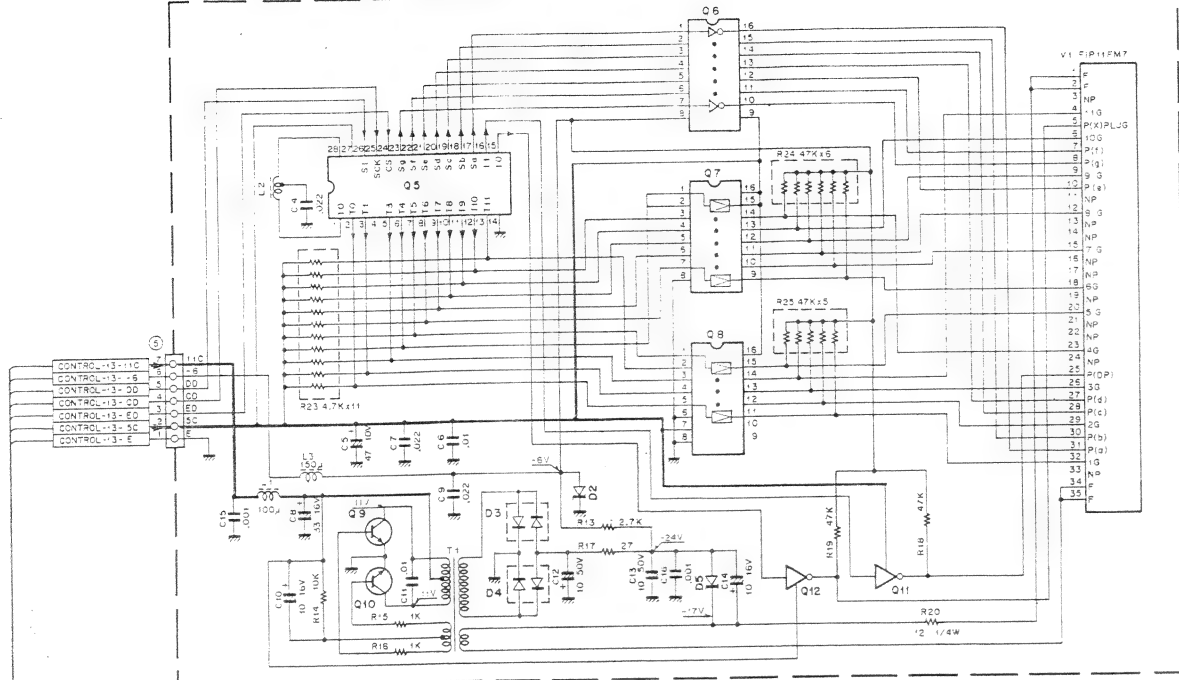
CONTROL UNIT (X53-1410-XX) (-12: TS-811 K -22: TS-811 M,X -52: TS-811 T -62: TS-811 W)



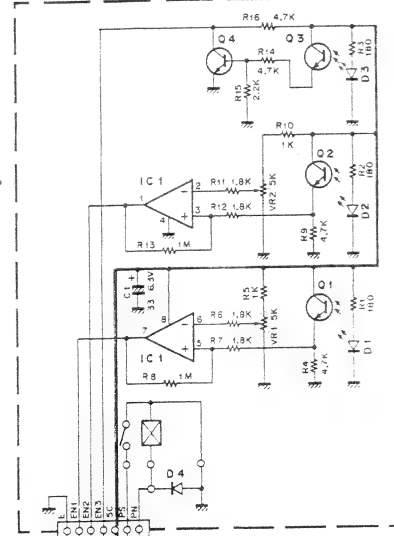
f = 435.00MHz, RX no signal, ( ) : TX.

# DISPLAY UNIT (X54-1820-11)

DISPLAY UNIT (X54-1820-11) (D/B, E/B, F/B)



## ENCODER ASS'Y (W02-0364-00)



## ENCODER ASS'Y (W02-0364-00)

- Q1~8 : DTA114(Y)  
Q7~10 : 2SC2458(Y)  
Q11,12 : DTC143T(S)  
Q13 : 2SC1959(Y)  
Q14 : 2SA1307(Y)  
Q15 : 2SC2703(O,Y)  
Q16~20 : 2SA1015(Y)  
Q21 : 2SA1048(Y)  
IC 1,2 : 2SA1115(E)  
or 2SA1115(B)  
IC 3~9 : MC14069UBCP  
or TC4069UBP  
IC 10 : TC4011BP or BU4011BP  
IC 11 : PST518A  
IC 12,17,22 : MC14584BCP  
IC 13 : 74LS174  
IC 14 : 74LS32  
IC 15 : MB8418-20LP-GRA  
IC 16 : 74LS138  
IC 18 : μPD8255AC-5  
IC 19 : or MSL8255AP-5  
IC 20 : or TMP8255AP-5  
IC 21 : μPC4558C  
IC 22 : MNE127A  
IC 23 : μPD7507G-575-00  
IC 24 : μPC7805H  
D1,3~7 : CAP401  
D2,8~10,12~15,18~29,33,35 : 1SS133  
D11 : MT291JB  
D16(T,W) : 1SS133  
D17 : MT2-12JB  
D30(K,T,W) : 1SS133  
D31(W) : 1SS133  
D32(W) : 1SS133  
D34(T,W) : 1SS133

- Q5 : μPD763C  
Q6 : μPA80C  
Q7,8 : TC5086BP  
Q9,10 : 2SC1959(Y)  
Q11,12 : DTA124(F)  
D2 : MT26-2JA  
D3,4 : MC931  
D5 : MT27-5JA  
Q1,2,3 : PN1265(R)  
Q4 : 2SC2458(Y)  
IC 1 : LM358P  
D1,2,3 : LN66(R)  
D4 : VO68

2SA1048  
2SA1115  
2SC2458

2SA1015  
2SC1959  
2SC2703

2SA1307

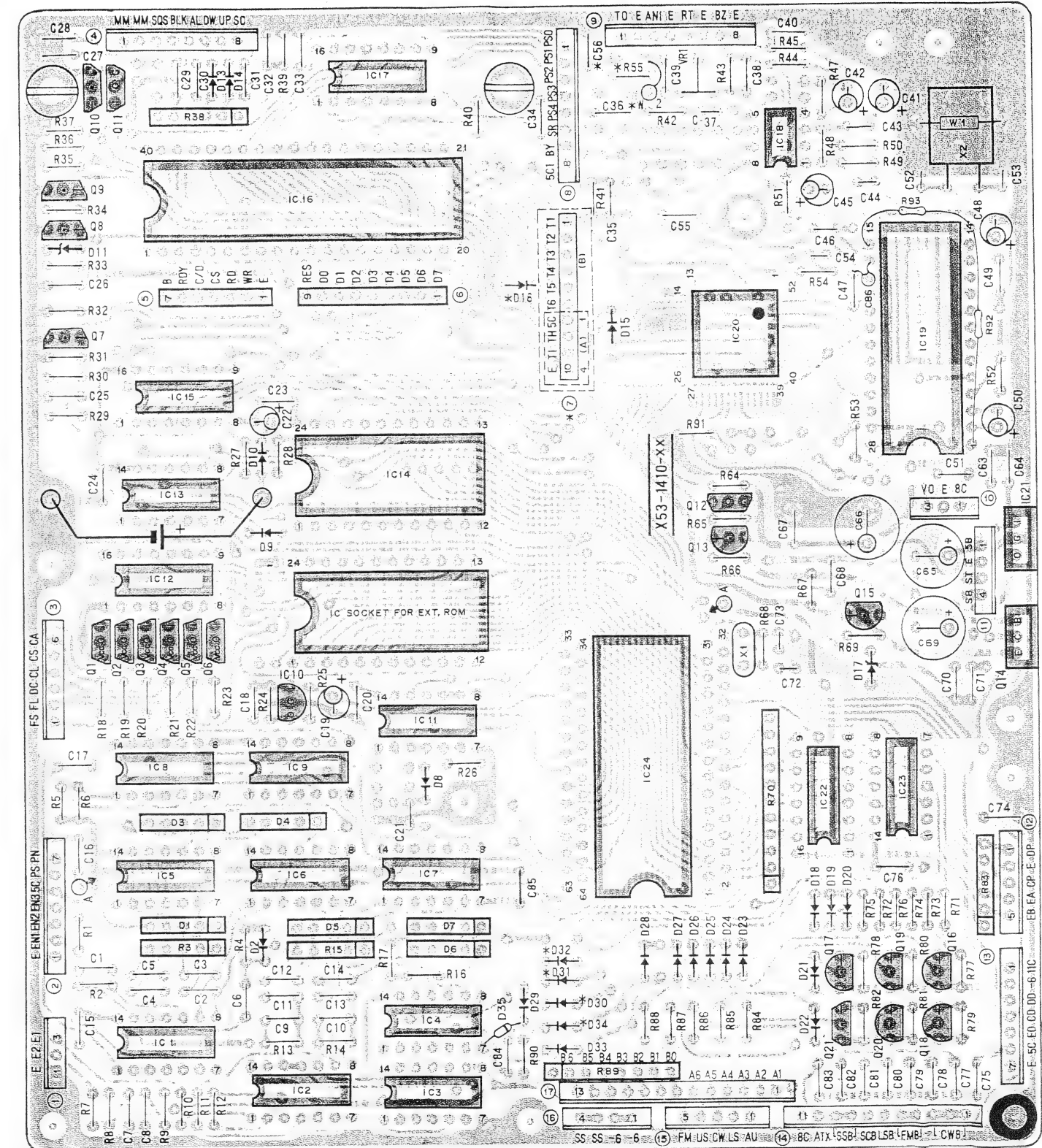
μPC7805H

DTC143T

DTA114Y

PST518A

# CONTROL UNIT (X53-1410-XX) Component side view (-12: TS-811 K -22: TS-811 M,X -52: TS-811 T -62: TS-811 W)

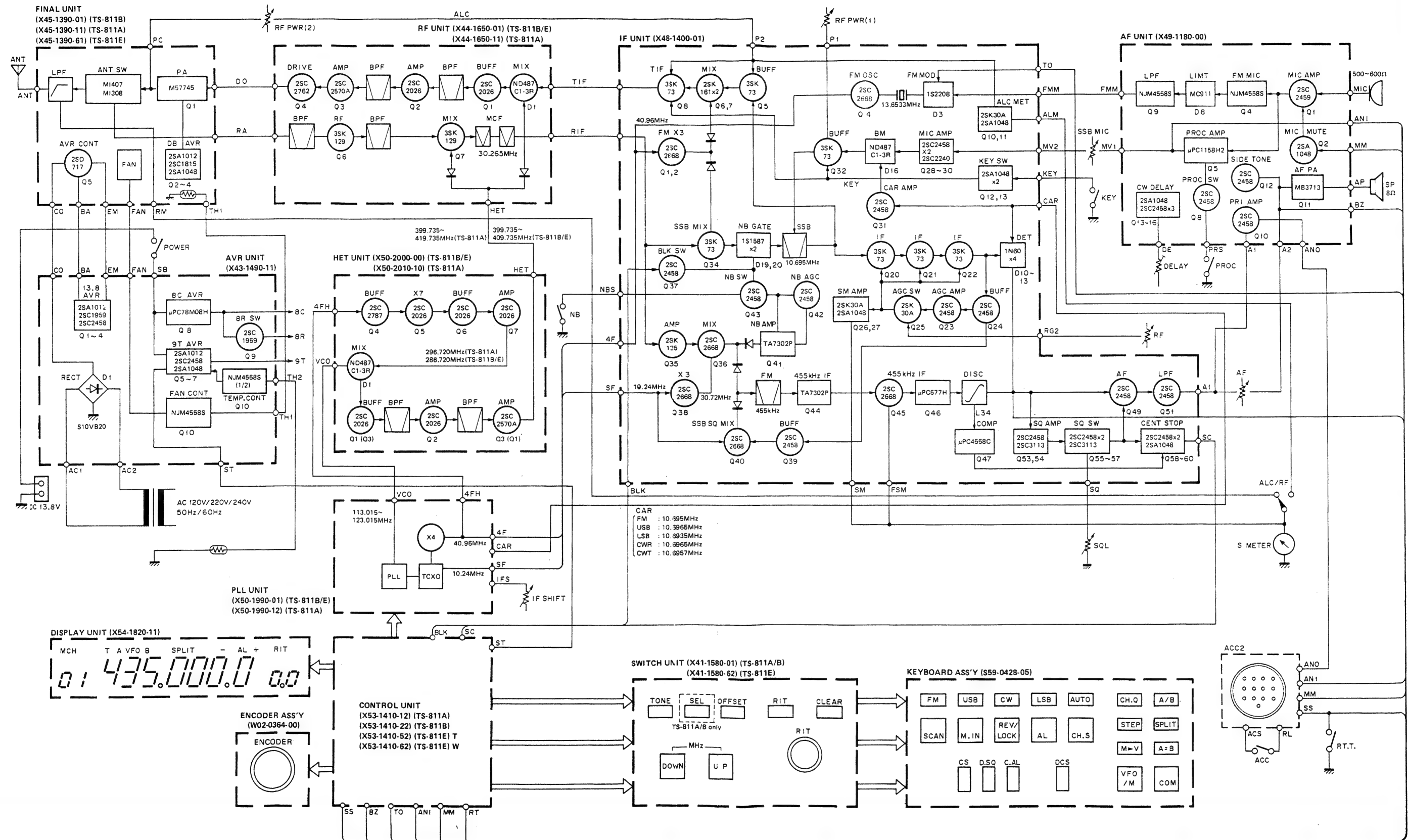


	C56	R55	D16	D30	D31	D32	D34	W2	(A)	(B)
K	○	X	X	○	X	X	X	○	X	○
M,X	○	X	X	X	X	X	X	○	X	○
T	X	○	○	○	X	X	○	X	○	X
W	X	○	○	○	○	○	○	X	○	X

○ : Used X : Not used

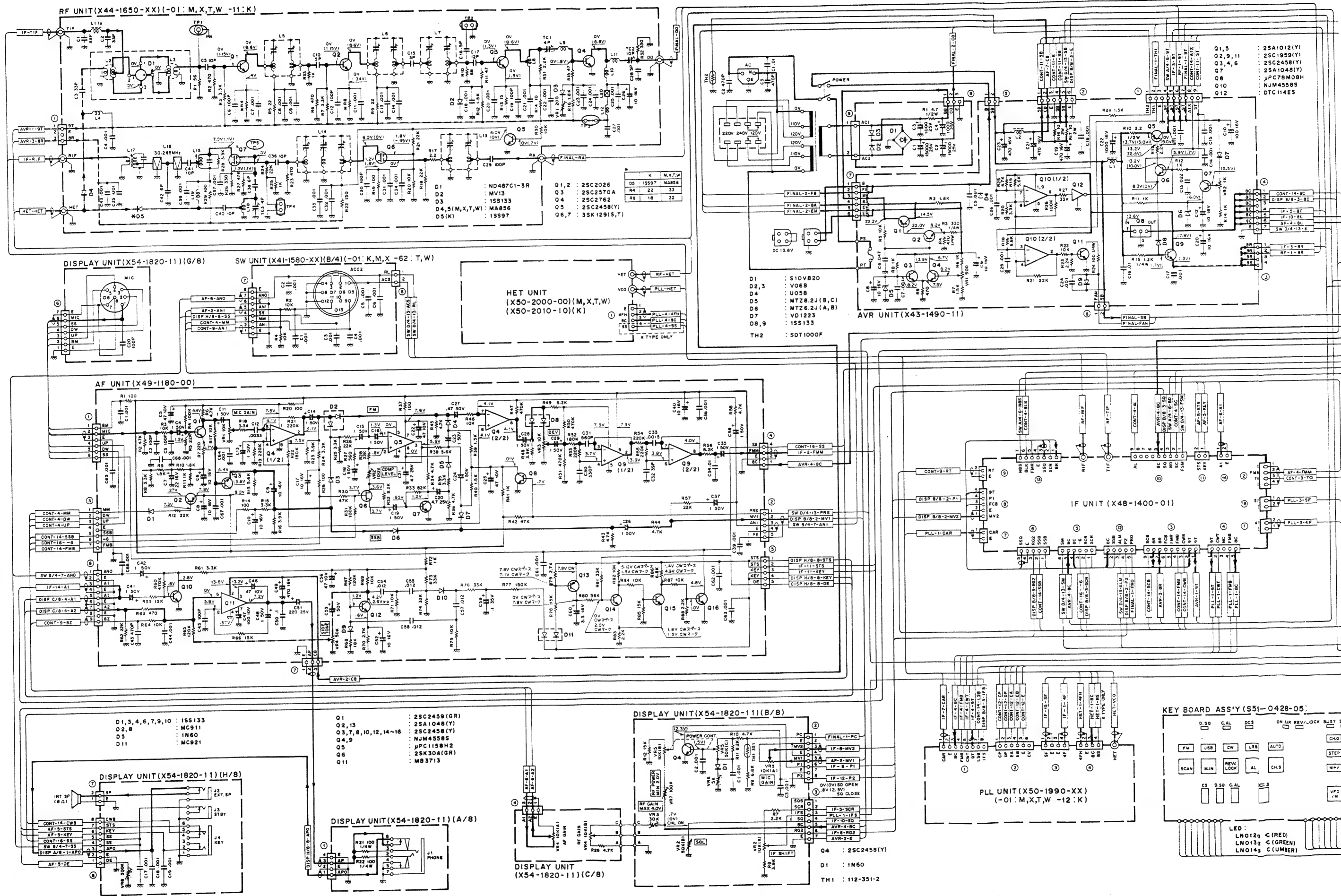


# PC BOARD VIEW/BLOCK DIAGRAM TS-811A/B/E



# TS-811A/B/E SCHEMATIC DIAGRAM

Signal Line --- Control Line --- Cor



G

H

I

J

K

L

M

N

O

P

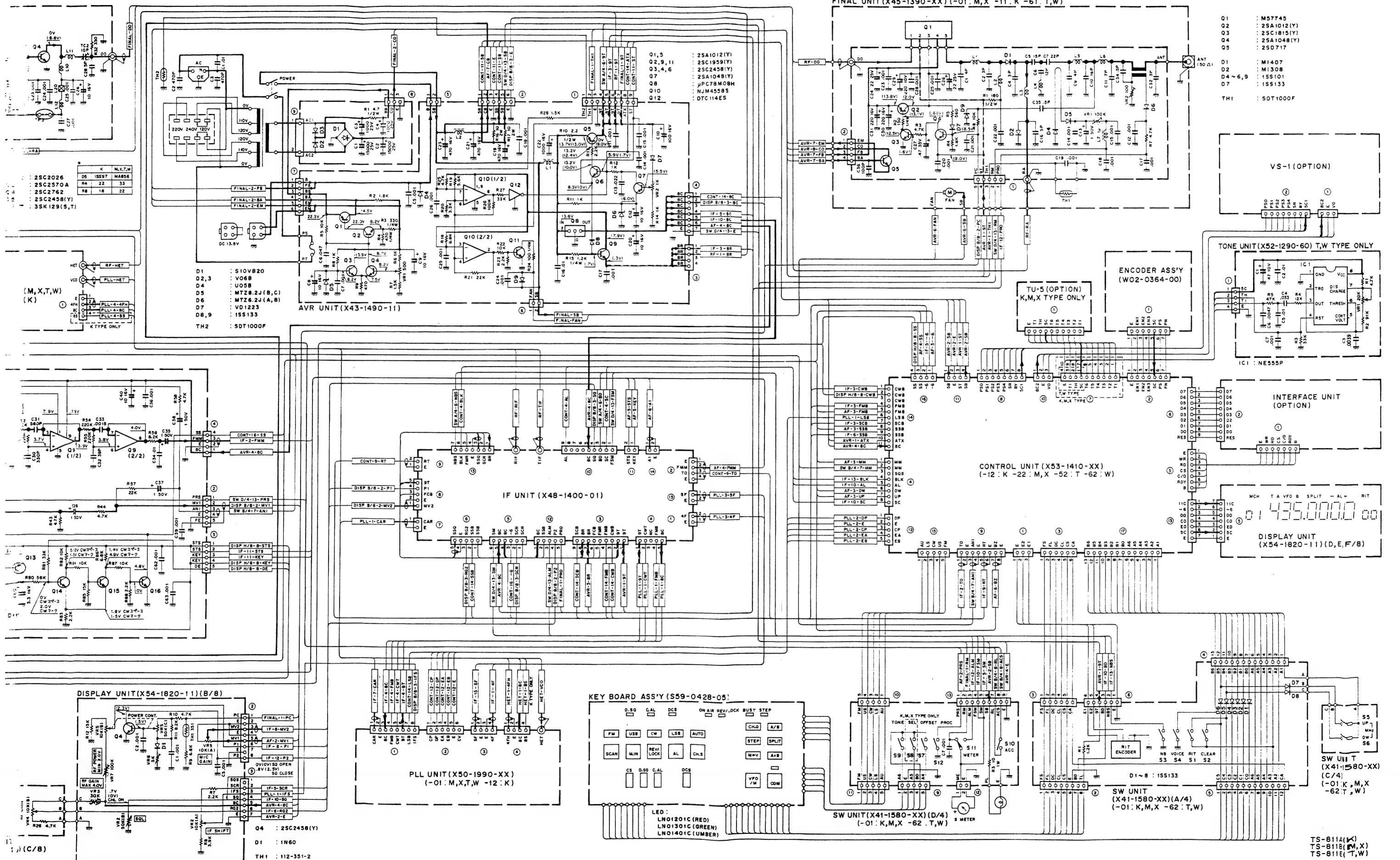
Q

Signal Line

Control Line

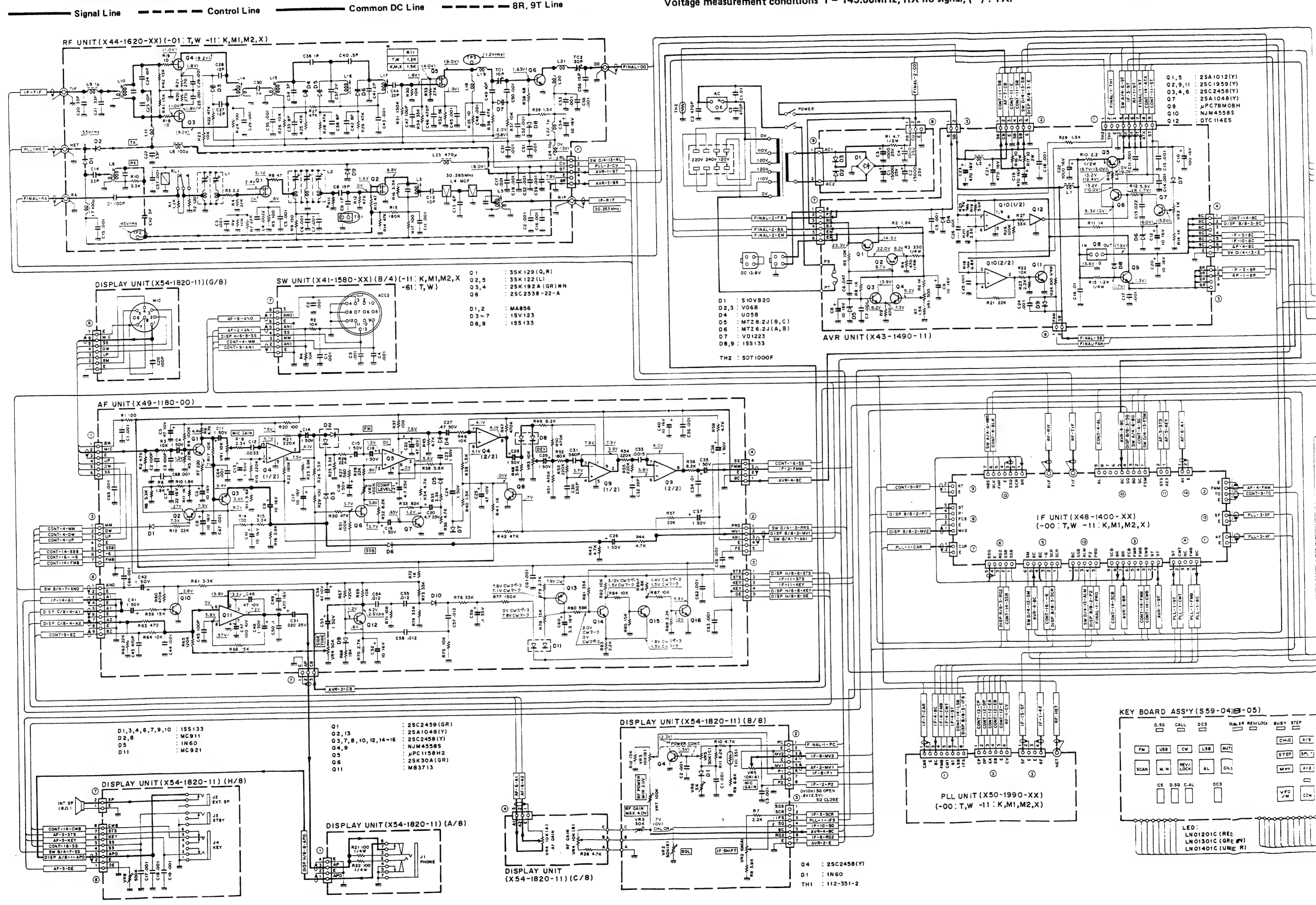
Common DC Line

8R, 9T Line

Voltage measurement conditions  $f = 435.00\text{MHz}$ , RX no signal, ( ) : TX.

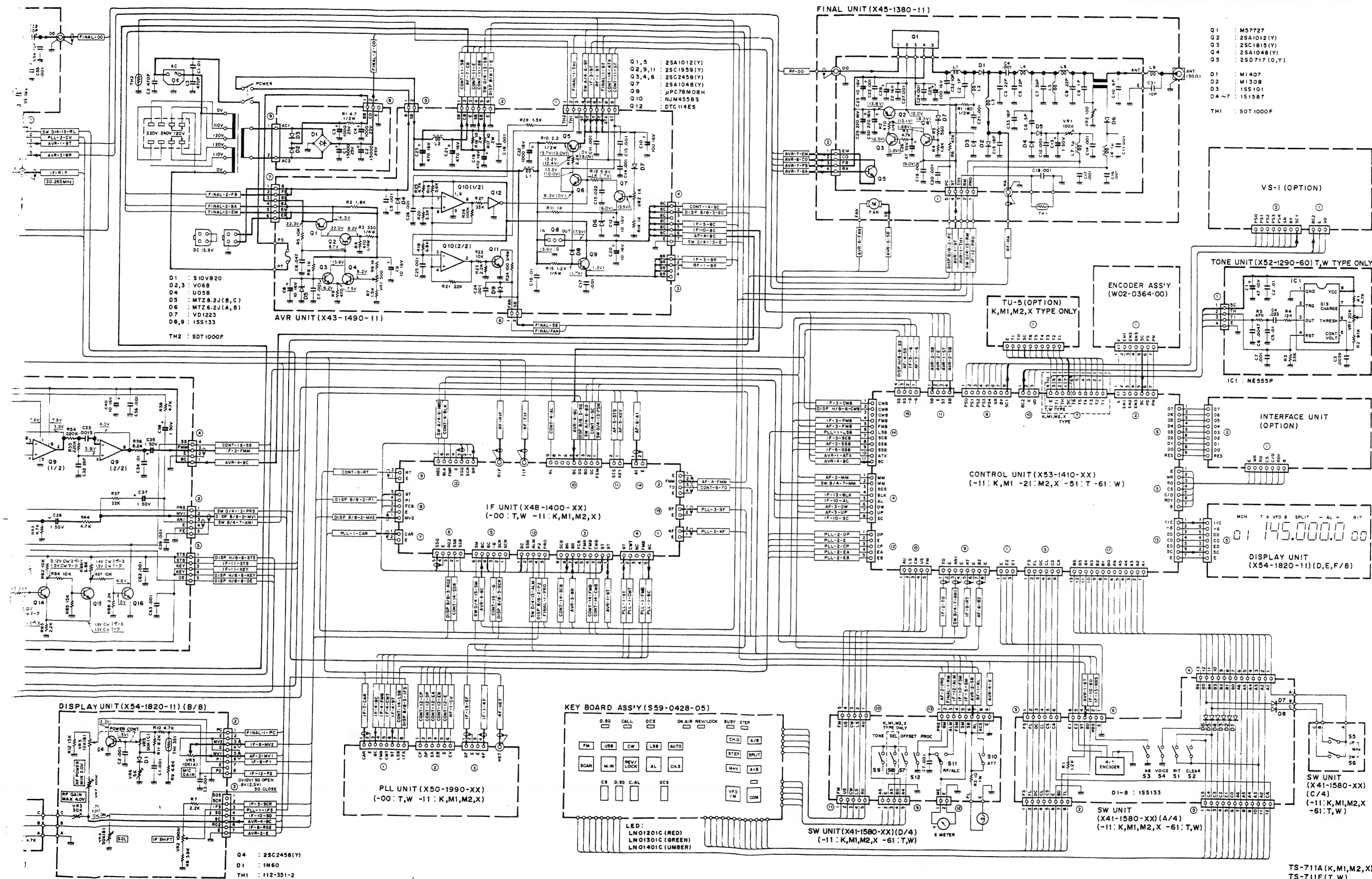


Voltage measurement conditions f = 145.00MHz, RX no signal, ( ) : TX.



Voltage measurement conditions f = 145.00MHz, RX no signal, ( ) : TX.

# SCHEMATIC DIAGRAM TS-711A/E



TS-711A (K,M1,M2,X)  
TS-711E (T,W)

CD-10 (CALL SIGN DISPLAY)

CD-10 (CALL SIGN DISPLAY)

PARTS LIST

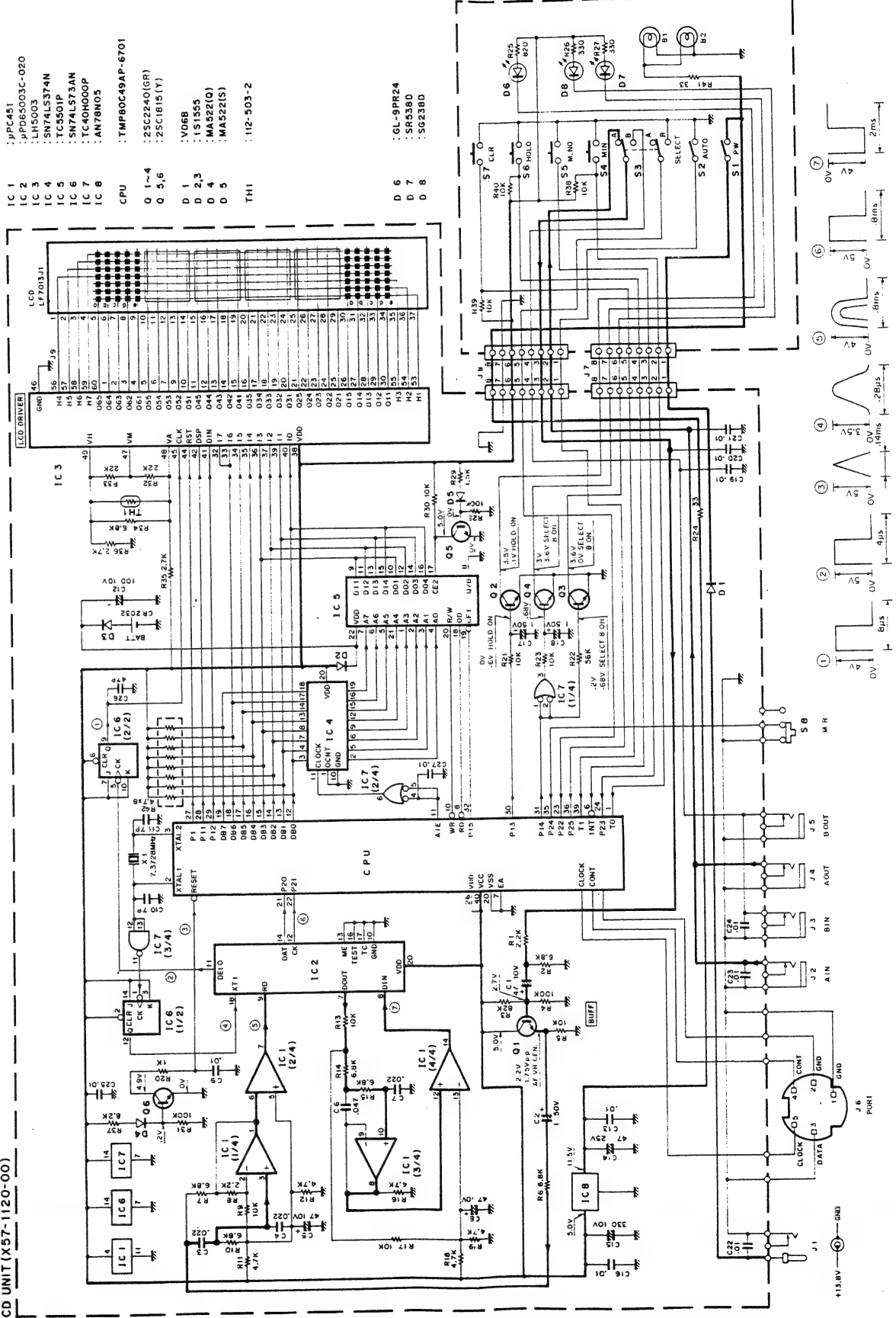
CD-10 GENERAL

PART NO		NOTE	NAME & DESCRIPTION	DISTINCTION & QUANTITY					REFERENCE NO
				011	021	051			
A02-0708-02	N		CASE	1	1				
A02-0709-02	N		CASE	1	1				
A13-0662-03	N		BLACKET	1	1				
A20-2539-02	N		PANEL	1	1				
B10-0671-04	N		FRONT GLASS	1	1				
B11-0415-14	N		LCD LIGHT GUIDING PLATE	1	1				
B11-0425-04	N		LCD LIGHT GUIDING SHEET	1	1				
B40-3560-04	N		MODEL NAME PLATE	1	1				
B42-2393-04	N		CABLE LABEL	1	1				
B43-1042-04	N		BADGE	1	1				
B43-1043-04	N		BADGE	1	1				
B46-0411-00	N		USER & WARRANTY	1	1				
B50-8013-00	N		INSTRUCTION MANUAL	1	1				
B50-8014-00	N		INSTRUCTION MANUAL	1	1				
E07-0552-05	N		SP DIN PLUG	1	1				
E29-0460-05	N		EXCHANGE PLUG	1	1				
E30-1797-05	N		DC CABLE ASS'Y	1	1				
E30-1798-05	N		CABLE WITH PLUG	1	1				
E30-1799-05	N		CABLE WITH PLUG	1	1				
G01-0821-04	N		COIL SPRING X9	7	7				
G11-0614-04	N		RUBBER RING	2	2				
H01-4626-03	N		CARTON	1	1				
H01-4627-03	N		CARTON	1	1				
H12-1375-14	N		BUFFER(B)	1	1				
H12-1372-13	N		BUFFER	1	1				
H25-0112-04	N		PROTECTIVE BAG 180X250	1	1				
H25-0103-04	N		BAG 125X250	1	1				
H25-0029-04	N		BAG(ACS) 60X110	1	1				
H25-0049-03	N		PROTECTIVE BAG 60X200	1	1				
J02-0435-05	N		RUBBER FOOT ACS	1	1				
J02-0436-04	N		FRONT FOOT ACS	1	1				
J29-0407-04	N		SW GUIDE A (TACT KNOB)	4	4				
J29-0409-04	N		SW GUID X3	3	3				
J32-0785-04	N		ROUND BOSS M2X6	2	2				
K27-0440-04	N		PUSH KNOB (E)	3	3				
K27-0441-04	N		PUSH KNOB (F)	1	1				
K27-0445-05	N		SQUARE KNOB (A)	2	2				
K27-0446-05	N		SQUARE KNOB (B)	1	1				
N08-0513-04	N		DRESSED SCREW	2	2				
N09-0633-05	N		SCREW (OTHERS)	2	2				
N14-0115-05	N		NUT	2	2				
N15-1040-46	N		FLAT WASHER	4	4				
N16-0040-46	N		SPRING WASHER	2	2				
N30-2006-41	N		PAN HD SCREW	2	2				
N30-4041-46	N		PAN HD SCREW	2	2				
N35-2004-41	N		BIND SCREW	3	3				
N89-2005-46	N		BIND TAPPING SCREW	3	3				
X57-1120-00	N		CD UNIT	1	1				

CD UNIT (X57-1120-00)

品名	仕様	単位	数量	備考	品名	仕様	単位	数量	備考
AN78N05	N	IC	1		IC			1	
B30-0833-05	N	LAMP	2		B			2	
CC45CH1H220J		CERAMIC	22P	50V	C			11	
CC45CH1H470J		CERAMIC	47P	50V	C			26	
CE04W1A70M		ELECTRO	47	10V	C			1, 5, 8	
CE04W1A101M		ELECTRO	100	10V	C			12	
CE04W1A331M		ELECTRO	330	10V	C			15	
CE04W1E470M		ELECTRO	47	25V	C			14	
CE04W1H010M		ELECTRO	0.01	50V	C			2, 17, 18	
CK45F1H103Z		CERAMIC	0.01	50V	C			9, 13, 16	
CK45B1H102K		CERAMIC	1000P	50V	C			27	
G092M1H223K		MYLAR	0.022	50V	C			3, 4, 7	
G092M1H473K		MYLAR	0.047	50V	C			6	
G91-0131-05		CERAMIC	0.01	25V	C			19, 20, 21, 22, 23, 24, 25	
E03-0161-05	N	DC JACK	1		J			1	
E06-0555-05	N	SP SOCKET	1		J			2, 3, 4, 5	
E11-0414-05	N	PHONE JACK	1		J				
GL9PR24		LED	RED	1	D			6	
LF7013J1	N	LCD			IC			3	
LH5003	N	IC			X			1	
L77-1268-05	N	XTAL	7.3728MHZ		D			4	
MA522(Q)		DIODE			D			5	
MA522(S)	N	DIODE			D				
R90-0557-05		MULTIPLE RESISTOR			R			42	
SG2380		DIODE			D			8	
SN74LS374N		IC			IC			4	
SN74LS373AN		IC			IC			6	
SN55380		DIODE			D			7	
S31-1417-05	N	SLIDE SWITCH			S			8	
S40-2443-05	N	PUSH SW			S			1, 2, 3	
S50-1426-05	N	TACT SWITCH			S			4, 5, 6, 7	
TC40H000P	N	IC			IC			7	
TC5501P	N	IC			IC			5	
TMP80C49AP-6701	N	CPU			CPU			1	
UPC451C	N	IC			IC			1	
UPD65003C-020	N	IC			IC			2	
V068		DIODE			D			1	
W09-0326-05		LITHIUM BATTERY			D			2, 3	
1S1555		DIODE	OR 1N4448		TH			1	
112-503-2		THERMISTOR			Q			1, 2, 3, 4	
2SC2240(GR)		TR			Q			5, 6	
2SC1815(Y)		TR			Q				

SCHEMATIC DIAGRAM

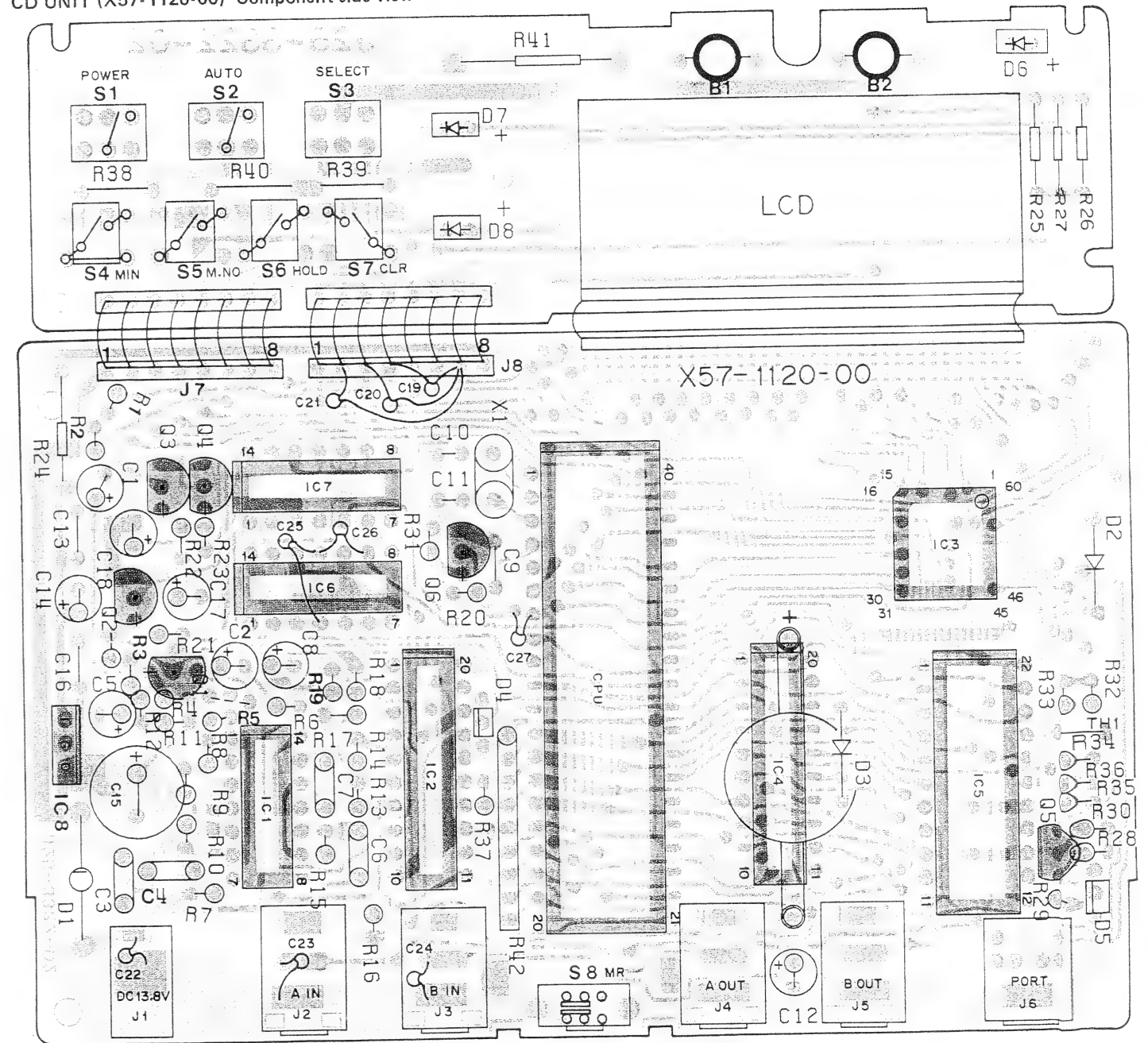
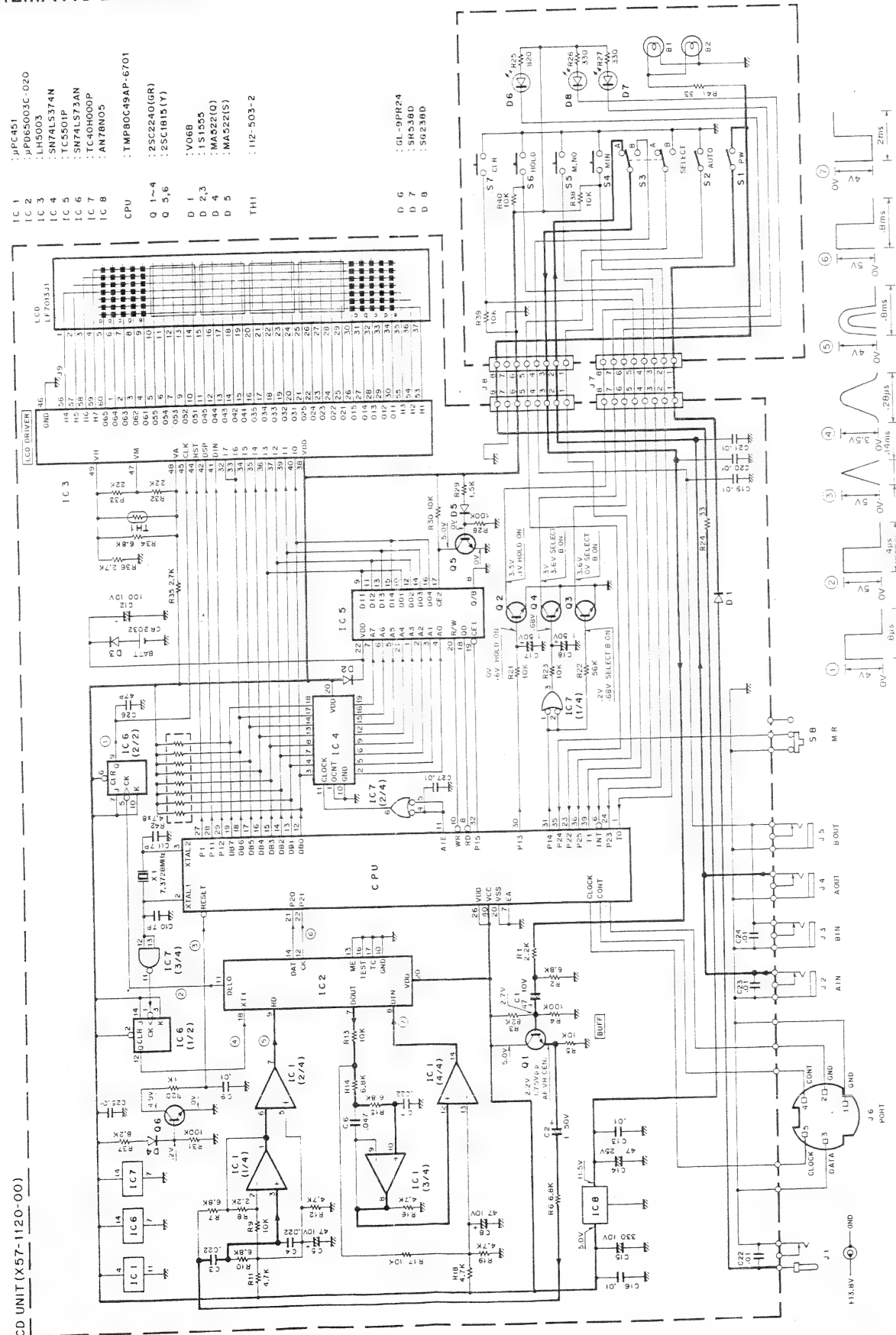




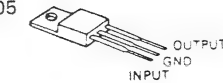
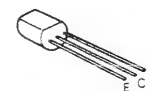
**CD-10 (CALL SIGN DISPLAY)**

## PC BOARD VIEW

TC 1	:P4051	CPU	:TMP80C49AP-E701
TC 2	:P405003C-020	Q 1~4	:25C2240(GR)
TC 3	:H5003	Q 5,6	:25C1815 (V)
TC 4	:SN74LS37AN		:V068
TC 5	:TC5501P	D 1	:TS1555
TC 6	:SN74LS73AN	D 2,3	:MAS22(Q)
TC 7	:TC40H002P	D 4	:MAS22(I)
TC 8	:ANT8N05	D 5	:MAS22(S)
		TH1	:112-503-2



AN78N05

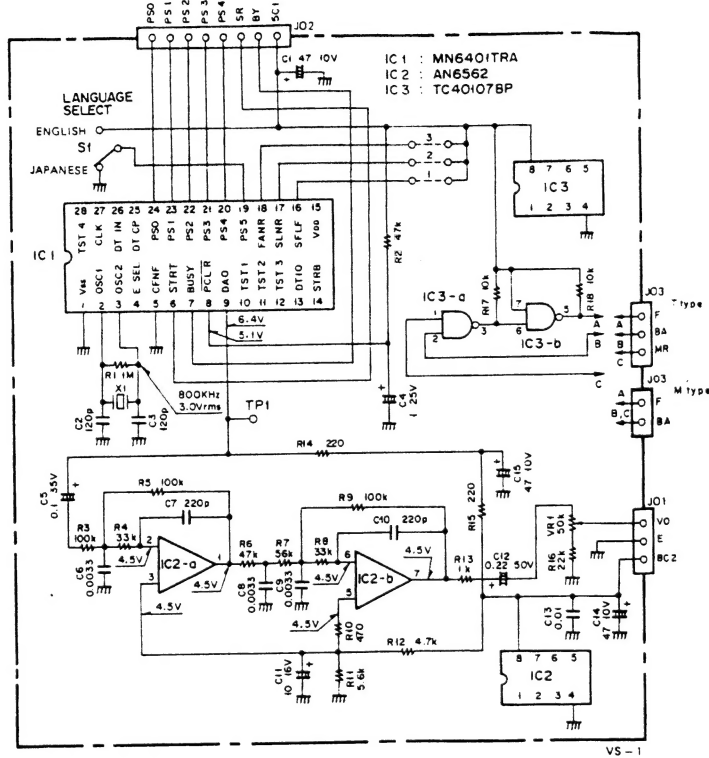


# VS-1 (VOICE SYNTHESIZER)

## PARTS LIST

Part No.	Re- marks	Description	Ref. No.
B50-4035-00	N	Instruction manual	
CC45SL1H121J	C	120P x 2	C2,3
CE04W1A470M	E	47 10V	C1,14,15
CE04W1C100M	E	10 16V	C11
CE04W1HR22M	E	0.22 50V	C12
CK45B1H221K	C	220P x 2	C7,10
CQ92M1H332K	ML	0.0033 x 3	C6,8,9
CS15E1E010M	T	1 25V	C4
CS15E1V0R1M	T	0.1 35V	C5
C91-0131-05	C	0.01 (SP)	C13
E40-0273-05	Δ	Mini connector 2P	M
E40-0373-05	Δ	Mini connector 3P	M
E40-0373-05	Δ	Mini connector x 2 3P	T
E40-0873-05	Δ	Mini connector 8P	T
H01-4481-03	NΔ	Packing carton (inside)	M
H01-4501-03	NΔ	Packing carton (inside)	T
H25-0029-04		Protective bag x 2	
L78-0006-05	N	Ceramic OSC	X1
N89-3006-46		Tapping screw x 4	
R12-4408-05		Trim. pot. 50kΩ	VR1
S31-1411-05	N	Slide switch	S1
AN6562	N	IC	IC2
MN6401TRA	N	IC	IC1
TC40107BP	N	IC	IC3

## SCHEMATIC DIAGRAM



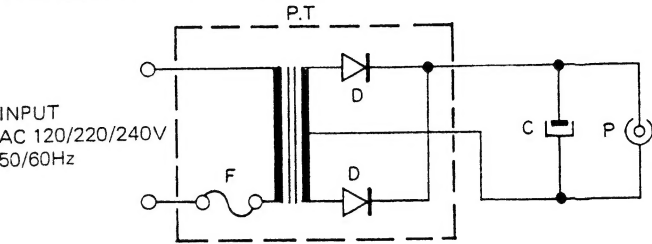
# AC-10 (CD-10 FOR CHARGER)/TU-5 (TONE UNIT)

## AC-10 SPECIFICATIONS

Input voltage . . . . . AC 120/220/240V  
 Frequency response . . . . . 50/60Hz  
 Output voltage . . . . . DC 13.8V  
 Output current . . . . . 200mA

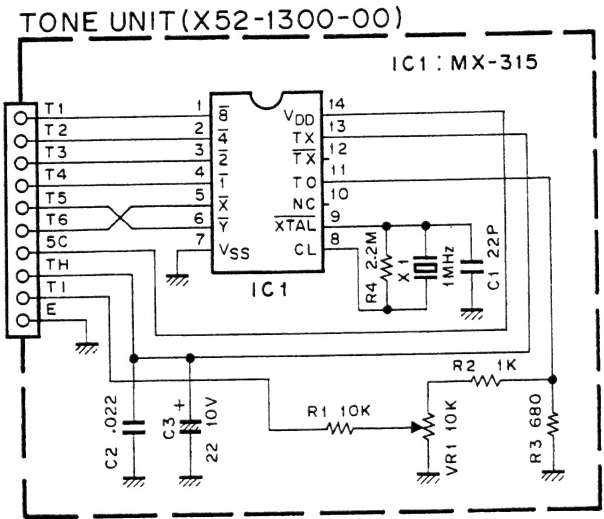
## AC-10 SCHEMATIC DIAGRAM

(Y61-2680-XX) (-21 : K,M -51 : T -61 : W -71 : X)



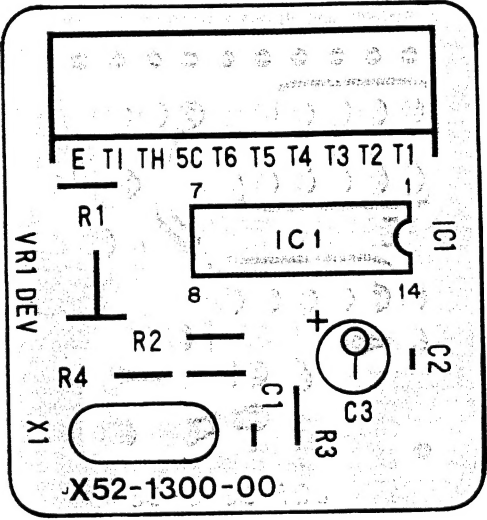
W09-0347-08 (K,M) AC 120V 60Hz  
 W09-0348-08 (T) AC 240V 60Hz  
 W09-0349-08 (W) AC 220V 50/60Hz  
 W09-0350-08 (X) AC 240V 50/60Hz

## TU-5 SCHEMATIC DIAGRAM

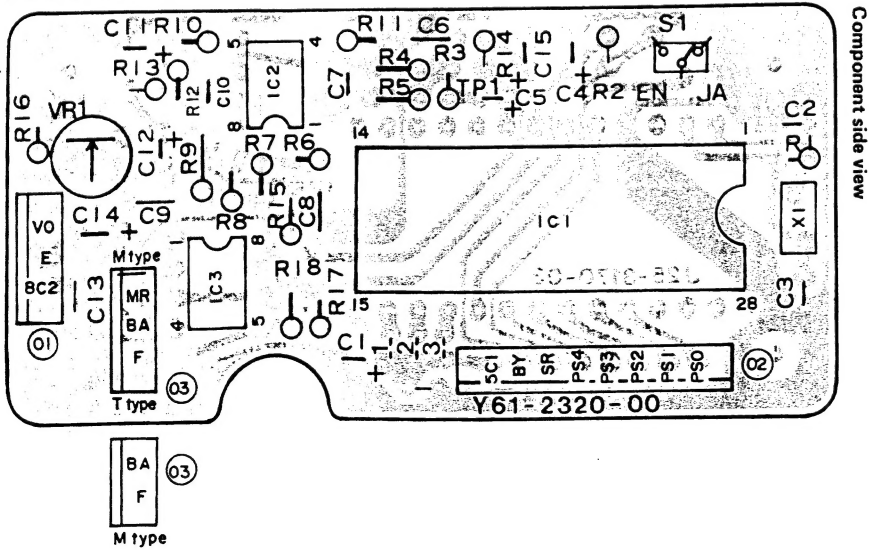


## TU-5 PC BOARD VIEW

TONE UNIT (X52-1300-00) Component side view

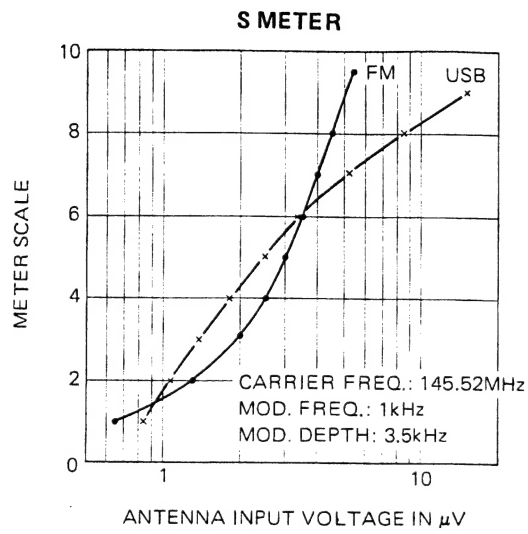
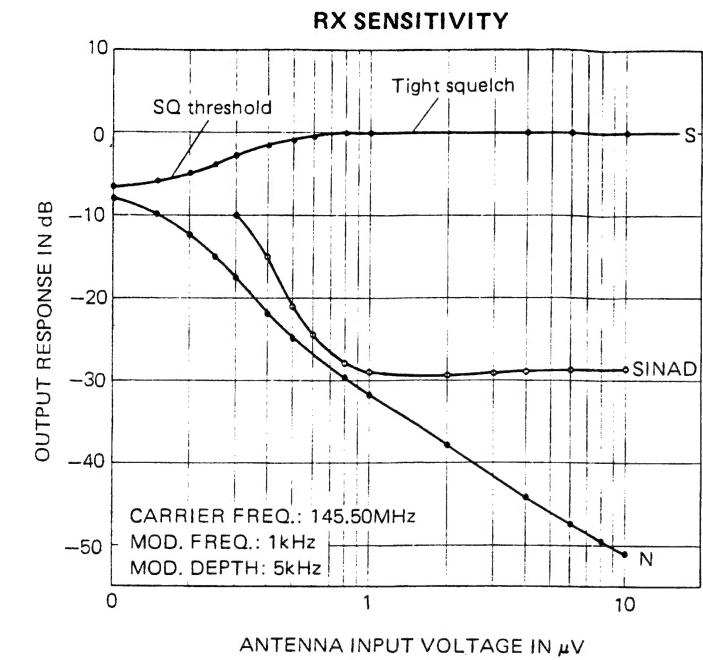


## PC BOARD VIEW

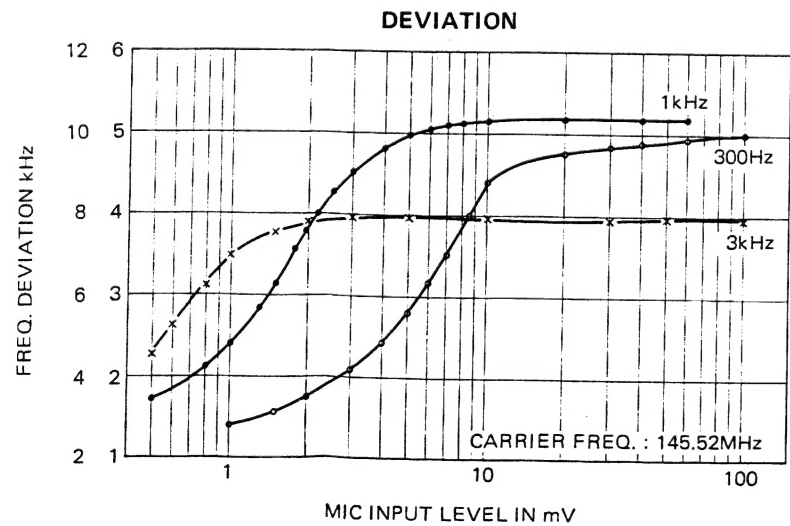
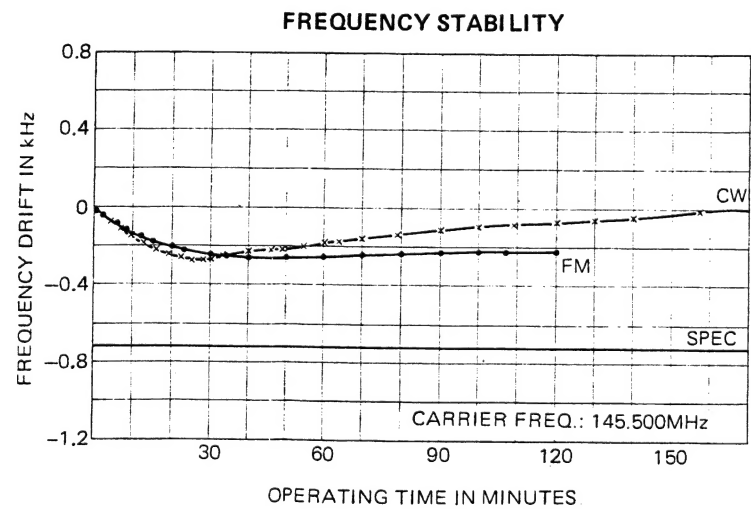




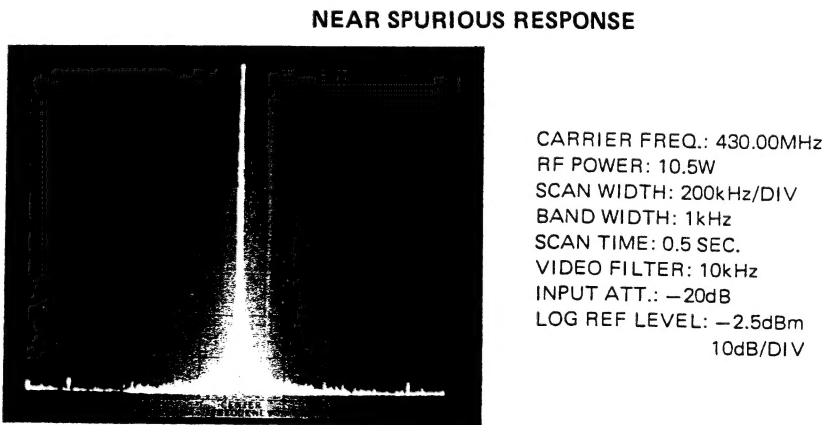
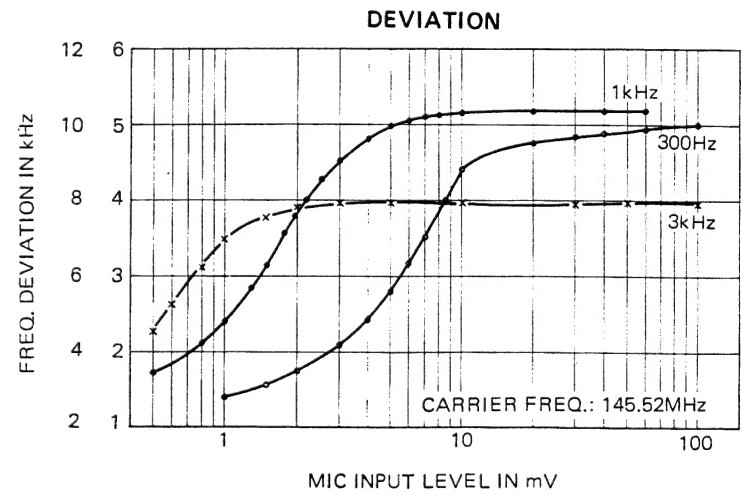
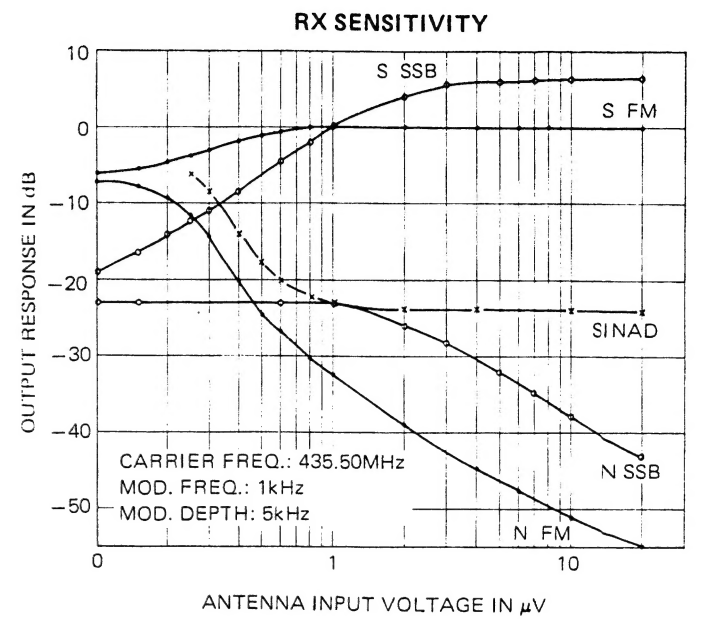
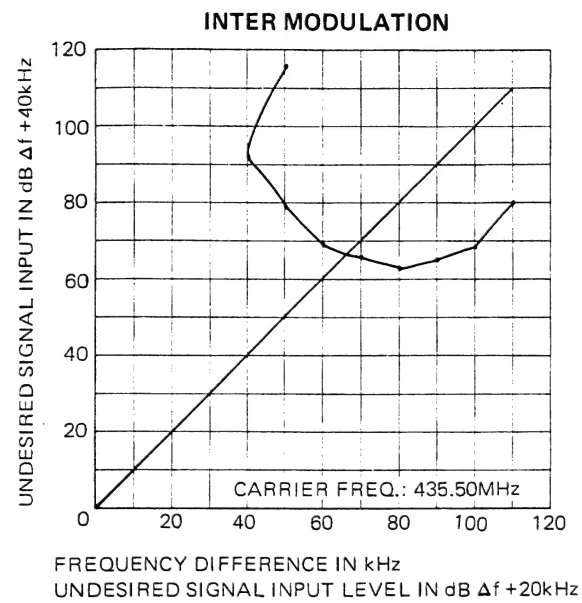
TS-711 REFERENCE DATA



Model	FM	USB
Scale		
S-9+20	9 $\mu V$	14 $\mu V$
S-9+40	16 $\mu V$	1.3mV



TS-811 REFERENCE DATA



# **TS-711 SPECIFICATION**

## **[General]**

Frequency range.....	144.0 ~ 148.0 MHz..... (TS-711A) 144.0 ~ 146.0 MHz..... (TS-711E)
Radio wave mode .....	A3J (SSB), F2, F3 (FM), A1 (CW)
Antenna impedance.....	50 ohms
Operating temperature .....	-10°C ~ +50°C
Power voltage.....	AC120V/240V/220V, 50/60 Hz DC 13.8V (12V ~ 16V)
Grounding .....	Negative
Power consumption .....	170W, 6.5A (DC13.8V) at maximum transmission 50W, 1.2A (DC13.8V) in receive mode without receiving signal
Frequency tolerance (-10°C ~ +50°C).....	Within ± 3 ppM (SSB/CW) Within ± 5 ppM (FM)
Frequency stability .....	± 300 Hz 1 ~ 60 minutes after power on Within 50 Hz/every 30 minutes 60 minutes later (after power on)
Dimensions .....	W270 × H96 × D260 mm (W279 × H108 × D327 mm) – Projected parts measured.
Weight.....	7.1 kg (15.62 lb)

## **[Transmitter]**

RF output power.....	25 watts (One minute transmission/three minutes reception) RF output variable from approx. 2W to maximum
Modulation.....	Balanced (SSB), Reactance (FM)
Spurious radiation .....	Less than -60 dB
Carrier suppression.....	Less than -40 dB
Side band suppression.....	Less than -40 dB
Maximum frequency deviation (FM) .....	± 5 kHz
Modulation distortion (FM60%) .....	Less than 3% (300 Hz ~ 3 kHz)
MIC impedance .....	500 ~ 600 Ω

## **[Receiver]**

Circuitry.....	Double superheterodyne
Intermediate frequency .....	1st 30.265 MHz 2nd 10.695 MHz (SSB/CW), 455 kHz (FM)
Receiver sensitivity FM.....	12 dB SINAD less than 0.22 μV..... (TS-711A) 12 dB SINAD less than 0.2 μV..... (TS-711E) S + N/N more than 50 dB at 1.0 mV input
SSB/CW .....	S + N/N 10 dB less than 0.16 μV..... (TS-711A) S + N/N 10 dB less than 0.13 μV..... (TS-711E)
Receiver selectivity FM.....	More than 12 kHz (-6 dB) Less than 24 kHz (-60 dB)
SSB/CW .....	More than 2.2 kHz (-6 dB) Less than 4.8 kHz (-60 dB)
Spurious response.....	Better than 70 dB
Squelch sensitivity .....	Less than 0.16 μV (threshold)
Auto scan stop level .....	Less than 0.2 μV (threshold)
Audio output power .....	More than 2.0 watts across 8 ohms load (5% dist.)
Audio output impedance .....	8 ohms

## **[DCS control]**

Code.....	NRZ equal-length code
Modulation.....	MSK modulation
Frequency deviation.....	± 2.5 kHz or more ± 5 kHz or less ± 3.5 kHz Standard
Mark frequency and deviation .....	1200 Hz ± 200PPM
Space frequency and deviation.....	1800 Hz ± 200 PPM
Code transmission speed and deviation .....	1200 bits/second ± 200 PPM

**Note:** Circuit and ratings are subject to change without notice due to developments in technology.

# TS-811A/B/E

## TS-811 SPECIFICATION

[General]	
Frequency range	430 ~ 440MHz (TS-811B/E) 430 ~ 450MHz (TS-811A)
Radio wave mode	A3J (SSB), F2, F3 (FM), A1 (CW)
Antenna impedance	50 ohms
Operating temperature	-10°C ~ +50°C
Power voltage	AC120V/220V/240V, 50/60Hz DC 13.8V (12V ~ 16V)
Grounding	Negative
Power consumption	220W, 8.0A (DC 13.8V) at maximum transmission (TS-811B/E) 240W, 8.5A (DC 13.8V) at maximum transmission (TS-811A) 50W, 1.2A (DC 13.8V) in receive mode without receiving signal
Frequency tolerance (-10°C ~ +50°C)	Within ± 3PPM (SSB, CW ; 430 ~ 440MHz) Within ± 5PPM (SSB, CW ; 440 ~ 450MHz) Within ± 5PPM (FM)
Frequency stability (430 ~ 440MHz)	± 1200Hz 1 ~ 60 minutes after power on Within 50Hz/every 30 minutes 60 minutes later (after power on)
Dimensions	W 270 x H 96 x D 260 mm (W 279 x H 108 x D 327 mm) — projected parts measured.
Weight	7.2kg (15.6lb)
[Transmitter]	
RF output power	25 watts (One minute transmission/three minutes reception) RF output variable from approx. 2W to maximum
Modulation	Balanced (SSB), Reactance (FM)
Spurious radiation	Less than -60dB
Carrier suppression	Less than -40dB
Side band suppression	Less than -40dB
Maximum frequency deviation (FM)	± 5kHz
Modulation distortion (FM 60%)	Less than 3% (300Hz ~ 3kHz)
MIC impedance	500 ~ 600Ω
[Receiver]	
Circuitry	Double superheterodyne
Intermediate frequency	1st 30.265MHz 2nd 10.695MHz (SSB/CW), 455kHz (FM)
Receiver sensitivity FM	12dB SINAD less than 0.2μV (TS-811B/E) 12dB SINAD less than 0.22μV (TS-811A) S + N/N more than 50dB at 1.0mV input
SSB/CW	S + N/N 10dB less than 0.13μV (TS-811B/E) S + N/N 10dB less than 0.14μV (TS-811A)
Receiver selectivity FM	More than 12kHz (-6dB) Less than 24kHz (-60dB)
SSB/CW	More than 2.2kHz (-6dB) Less than 4.8kHz (-60dB)
Spurious response	Better than 60dB
Squelch sensitivity	Less than 0.16μV (threshold)
Auto scan stop level	Less than 0.2μV (threshold)
Audio output power	More than 2.0 watts across 8 ohms load (5% dist.)
Audio output impedance	8 ohms
[DCS control]	
Code	NRZ equal-length code
Modulation	MSK modulation
Frequency deviation	± 2.5kHz or more ± 5kHz or less ± 3.5kHz Standard
Mark frequency and deviation	1200Hz ± 200PPM
Space frequency and deviation	1800Hz ± 200PPM
Code transmission speed and deviation	1200 bits/second ± 200PPM

Note : Circuit and ratings are subject to change without notice due to developments in technology.

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